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WHAT WE PLAN TO DO—PLANS, PROGRAMS, PROJECTS

4.1 INTRODUCTION

Moving Forward 2055 is built around NYMTC's Shared Vision for Regional Mobility as described in Chapter 1. This Shared Vision provides a strategic framework for the Plan's recommended strategies and actions. It also provides a framework for the proposed transportation improvement projects in the Plan, both within the Plan's forecast financial envelope as well as its speculative *vision* element. These strategies, actions, and project proposals provide organizational guidance for NYMTC to invest Federal transportation resources in improvement projects and planning activities.

This chapter provides a detailed description of the Shared Vision's seven goals and related objectives in detail. It also presents strategies and tactics (actions) that are intended to execute the goals and objectives. This framework can be described as follows:

- » **Goals** are outcomes one aims to achieve.
- » **Objectives** are measurable steps to achieve goals.
- » **Strategies** are plans or approaches designed for the successful execution of objectives.
- » **Tactics** or **Actions** are small actionable tasks within strategies.

The chapter is organized in modules related to each goal and its objectives. The modules include a description of the goal; and the existing conditions, relevant trends and related existing programmatic initiatives related to the goal and its objectives. This information guides the short- and medium-term strategies and actions that the Plan recommends for the goal and its objectives, which in turn provides a framework for NYMTC's planning activities, technical studies, and improvement project selections. The guiding principles that are part of the Shared Vision also frame the recommended strategies and actions in each goal module.

4.2 VISION GOAL—SAFETY

We seek to establish and maintain a transportation system for which safety and security are maximized for people and goods across all uses and modes.

4.2.1 DESCRIPTION

This goal seeks to enhance the transportation system's safety and security in NYMTC's planning area. According to U.S. DOT:

- » Safety is defined as freedom from harm, resulting from unintentional acts or circumstances.
- » Security is defined as freedom from intentional harm and tampering that affects both motorized and non-motorized travelers and may also include natural disasters.

Transportation safety and security are also national priorities: planning factors defined in Federal transportation legislation call for developing transportation system projects through a long-range transportation plan to increase the transportation system's safety and security for motorized and non-motorized users.

The transportation system's safety and security are integral to NYMTC's Shared Vision for Regional Mobility, as well as to NYSDOT's Strategic Highway Safety Plan, which is a major component of the Federal Highway Safety Improvement Program (HSIP). Understanding safety and security issues, conditions and trends is critical to the future quality and effectiveness of the transportation system.

4.2.2 OBJECTIVES

- » Ensure that investments in transportation assets enhance the safety and security of passengers and freight systems.
- » Prioritize safe streets, intersections, railroad grade crossings and shared-use rights-of-way and establish road safety initiatives that follow a Safe System approach.
- » Coordinate safety management, training, and safety education for all who share our streets across jurisdictional borders.

- » Improve operational safety and security, incorporating the changing nature of transportation and technology so that transportation facilities safely accommodate all travelers.
- » Strengthen connected vehicle programs and policies and champion driver assist programs and other technologies that contribute to overall system and individual user safety.
- » Improve in-person and automated safety enforcement procedures.
- » Prioritize the safety of transportation system operators, workers, and contractors through planning and coordinated management of work zones.

4.2.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

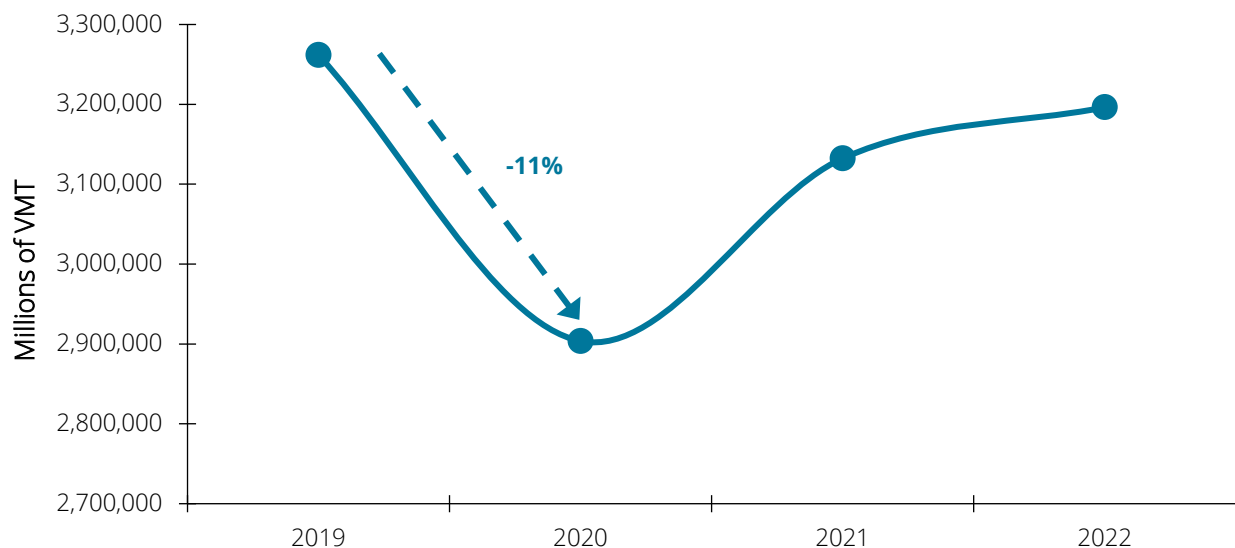
RECENT TRENDS AND CURRENT CONDITIONS

The COVID-19 pandemic impacted the level and type of travel in NYMTC's planning area. Comprehensive pandemic lockdowns, which began mid-March 2020 and lasted for several months, limited travel and were followed by expanded work-from-home (WFH) policies, various restrictions, and other requirements for social distancing through 2021. In turn, these widespread changes also affected transit and traffic safety.

Pandemic impacts on highway travel can be defined through trends in vehicle miles traveled (VMT) at the national and state levels, as well as for NYMTC's planning area. Figure 4.1 and Figure 4.2 present those trends for 2019 through 2022. Although all of the trends at the three levels show the same general pattern—VMT reduction in 2020 followed by gradual recovery in the subsequent years—the comparative trends in Figure 4.2 demonstrate that highway travel in New York State and the NYMTC planning area saw a slightly greater relative reduction in VMT than was seen nationally and a slightly slower recovery.

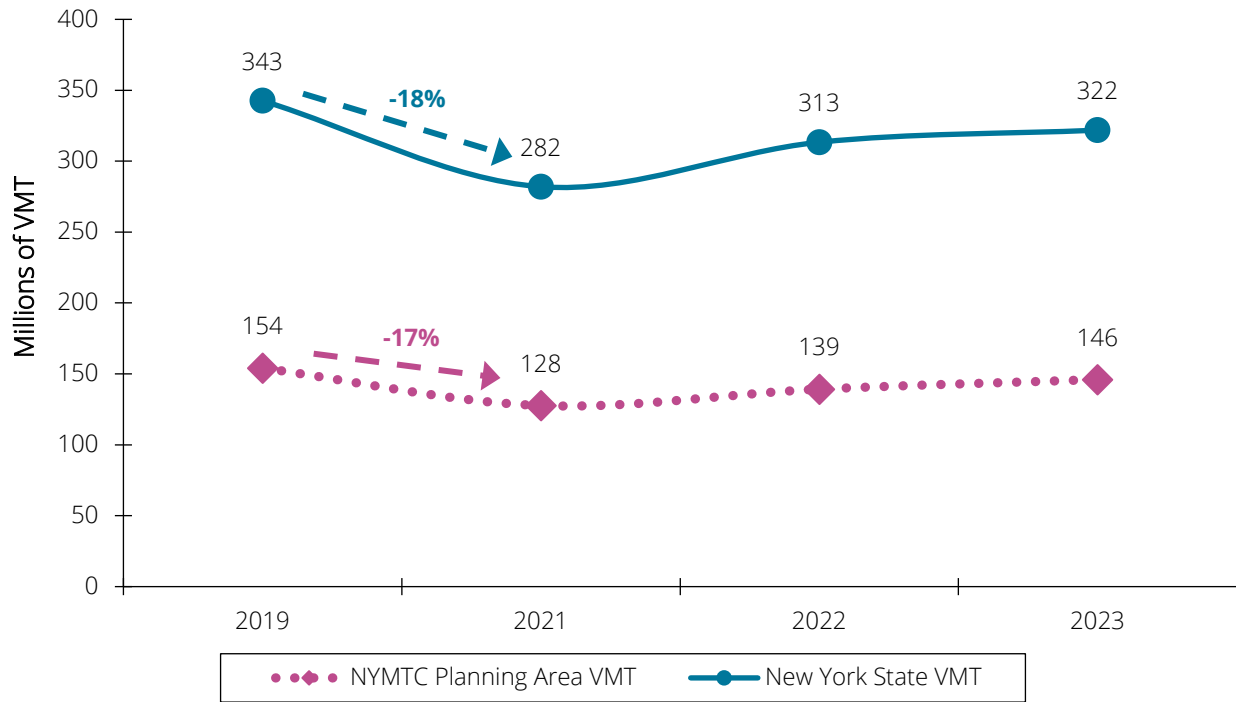
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Figure 4.1 National VMT (Millions)



Source: NHTSA; Traffic Safety Facts Annual Report Portal, August 2024.

Figure 4.2 NYMTC Planning Area and New York State VMT (Millions)

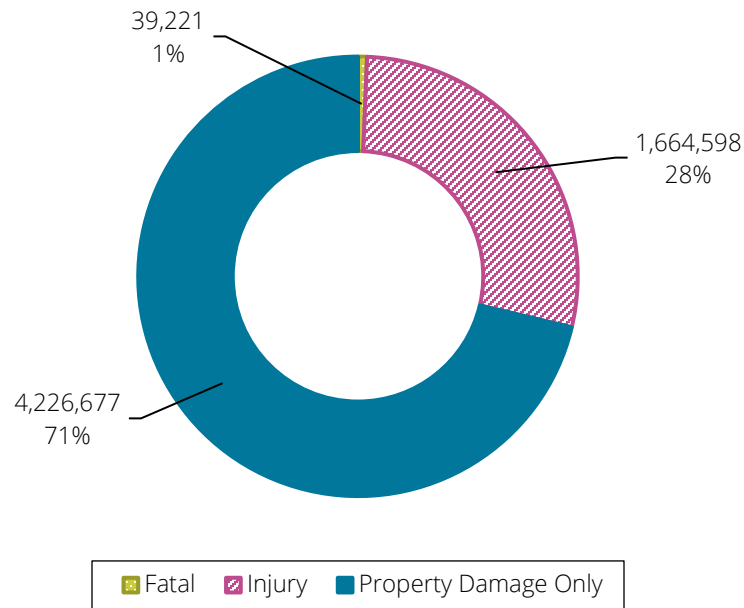


Source: NYSDOT.

As a result of this public health situation, metrics used to assess transportation safety conditions and trends were also affected during the two years of the greatest pandemic impacts. Given that, as with the VMT trends presented above, the safety trends described below are a comparison to pre-pandemic conditions in 2019 in contrast to metrics from 2020 through 2022 or 2023.

MOTOR VEHICLE FATALITIES AND INJURIES

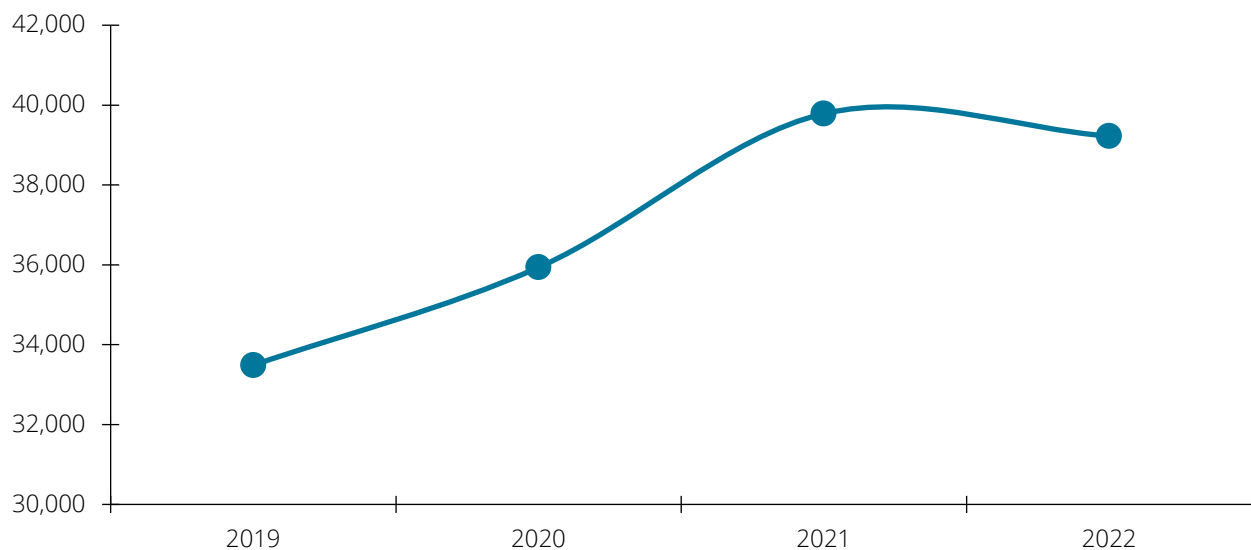
According to the National Highway Traffic Safety Administration (NHTSA), an estimated 5,930,496 police-reported traffic crashes took place across the country in 2022. Of these crashes, 39,221 (0.66 percent) involved fatalities in which 42,514 people were killed. Crashes involving injuries totaled 1,664,598 (28 percent), in which 2,382,771 people were injured. The remainder of the crashes, 4,226,677 (71 percent), resulted in property damage only.

Figure 4.3 2022 Police-Reported Motor Vehicle Traffic Crashes

Source: NHTSA National Statistics

Fatal crashes have run counter to the national, state, and regional trends in vehicle travel described above. Whereas national VMT dropped 11 percent in the pandemic year of 2020 and was still 2 percent below the 2019 level in 2022, NYS VMT dropped 18 percent in 2022 and was 6 percent below the 2019 level in 2022, and VMT in NYMTC's planning area dropped 17 percent in 2020 and was still 5 percent below the 2019 level in 2022, fatal crashes increased over 7 percent in 2020 and again in 2021 to 19 percent above the 2019 level. Fatal crashes decreased in 2022 but were still 17 percent above the 2019 level.

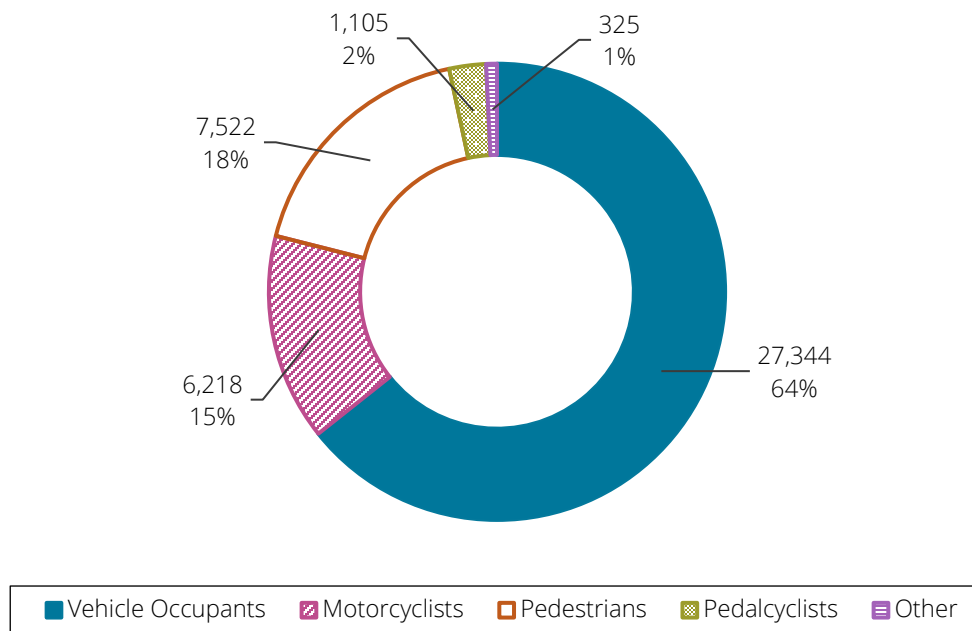
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Figure 4.4 National Fatal Motor Vehicle Crashes

Source: NHTSA National Statistics.

As a result of these trend differences, the rates of fatalities increased over the period in question, jumping from 1.11 fatalities per million vehicle miles to 1.34 in 2020 and 1.38 in 2021, before moderating to 1.33 in 2022. The victims of fatal traffic crashes included vehicle occupants, pedestrians, motorcyclists, and cyclists. In 2022, 64 percent of fatalities in motor vehicle crashes were occupants of vehicles, 18 percent were pedestrians, 15 percent were motorcyclists and 2 percent were cyclists.

Figure 4.5 National Traffic Crash Victims—Fatalities

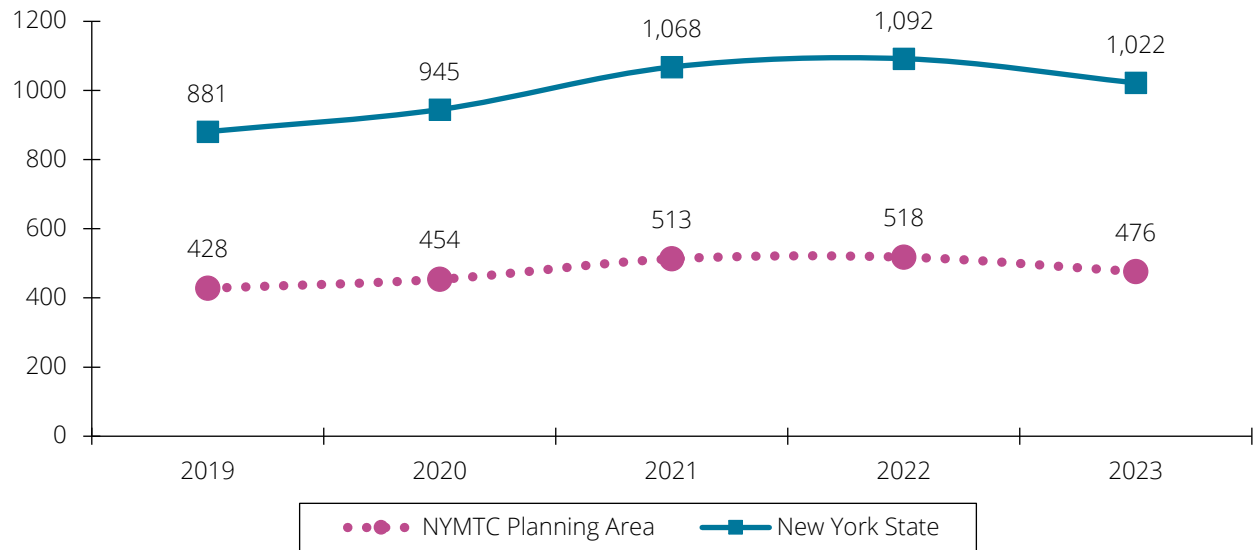


Source: NHTSA National Statistics.

State trends in traffic fatalities mirrored the national trends. According to the Institute for Traffic Safety Management & Research (ITSMR), 881 fatalities occurred in traffic crashes statewide in 2019, roughly 2 percent of the national total. Of these, 428 occurred in NYMTC's planning area, representing 49 percent of the state's total fatalities. In 2020, state traffic crash fatalities jumped to 945, an increase of just over 7 percent. Of those, 454 occurred in NYMTC's planning area, an increase of 6 percent over those in 2019.

By 2021, 1,068 fatalities took place statewide, a 21 percent increase over 2019 fatalities, even though statewide VMT decreased by 8.7 percent from 2019 levels. Of these, 513 fatalities, or 48 percent of statewide fatalities, occurred in NYMTC's planning area. In 2022, statewide fatalities increased to 1,092, a 24 percent increase over 2019 levels, despite a decrease of 6.1 percent from 2019 VMT levels. 518 of the 2022 fatalities took place in NYMTC's planning area, accounting for 47 percent of statewide fatalities. These totals decreased in 2023 statewide and NYMTC's planning area, with 1,022 fatalities statewide, a decrease of 6.4 percent from 2022, 476 of which took place in NYMTC's planning area, a decrease of 6.1 percent from 2022.

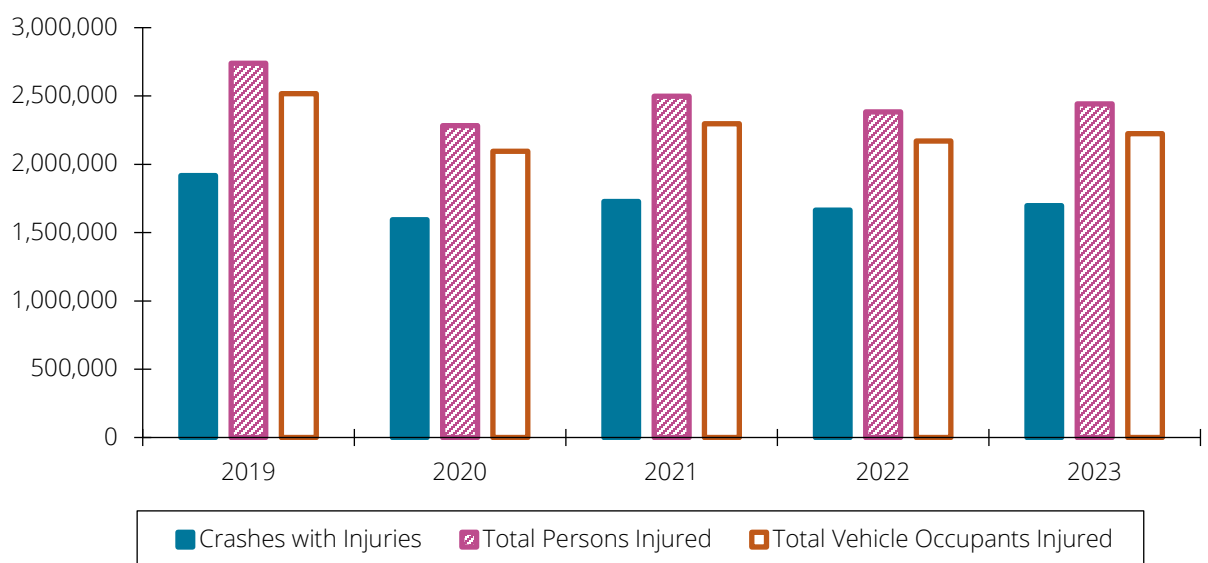
Overall, despite significant statewide and NYMTC planning area reductions in travel, fatalities increased over three consecutive years (2020–2022) and in 2023 decreased slightly, however still remain above pre-pandemic levels (even as VMT remains below pre-pandemic totals).

Figure 4.6 NYMTC Planning Area and New York State Fatal Crashes

Source: Institute for Traffic Safety Management & Research.

In terms of injuries due to traffic crashes, in 2019 approximately 1.9 million traffic crashes involved injuries, in which 2.7 million people were injured, 2.5 million of which were vehicle occupants. During 2020, figures dropped 16 percent to 1.6 million crashes, in which 2.3 million people were injured. In 2021, traffic crashes resulting in injuries increased 9 percent to 1.72 million, which still represented a decrease of 9 percent from 2019. Crashes injured 2.5 million people but decreased in 2022 by 13 percent to 1.66 million, injuring 2.4 million people, 1.6 million of which were vehicle occupants. Injury crashes in 2022 show a 13 percent decrease from 2019 and with 11 percent fewer injuries than in 2019. Injury crashes slightly increased again in 2023 to nearly 1.7 million, resulting in over 2.44 million people injured.

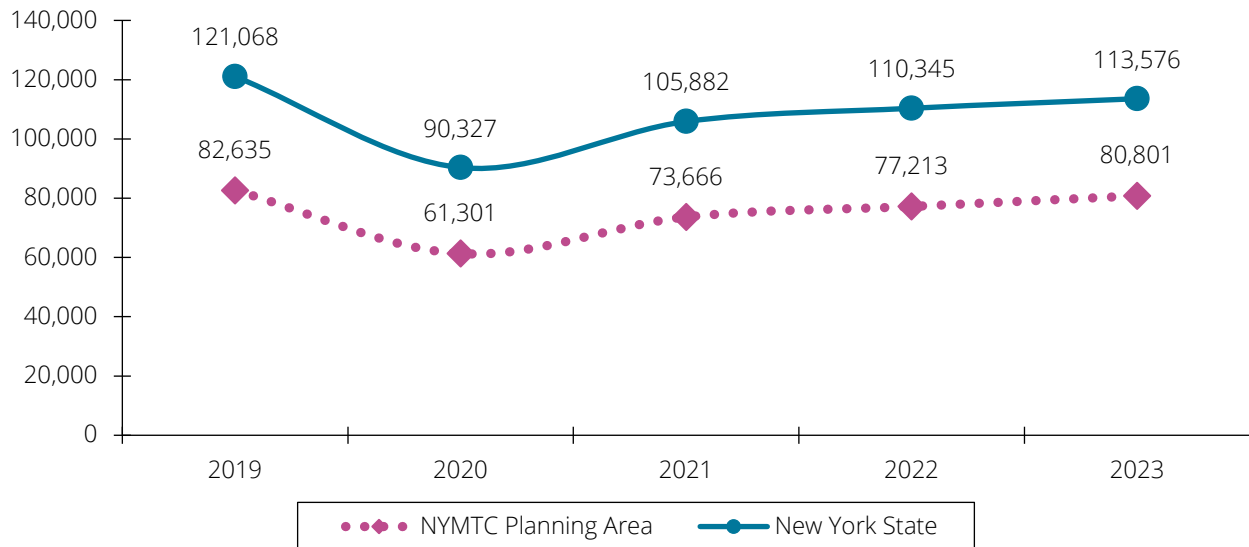
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Figure 4.7 National Injury Statistics for Traffic Crashes

Source: NHTSA, Traffic Safety Facts Annual Report Tables.

Injury crashes across NYS and NYMTC's planning area followed national trends. As seen in Figure 4.8, crashes dropped by roughly 25 percent in the 2020 pandemic year both statewide and in NYMTC's planning area and increased each year thereafter. By 2023, the number of crashes had not returned to the 2019 level for either the entire state or for NYMTC's planning area. For NYS, 2023 injury crashes were 6 percent less than 2019, while for NYMTC's planning area, 2023 injury crashes were 2 percent less than 2019. In 2019, injury crashes in NYMTC's planning area accounted for 68 percent of the statewide total. By 2023, NYMTC planning area injury crashes were 71 percent of the statewide total.

Figure 4.8 NYMTC Planning Area and New York State Injury Crashes



Source: Institute for Traffic Safety Management & Research.

Several underlying factors or risks are responsible for most motor vehicle crashes leading to fatalities and serious injuries in NYMTC's planning area. Although advancements in vehicle and roadway design have continued to improve motor vehicle safety, statistics show human behavior continues to be the biggest factor for motor vehicle crashes.

Road user behaviors that pose safety risks include:

- » **Impaired Driving**—Associated behaviors include operating vehicles while under the influence of drugs and/or alcohol or while impaired due to medical conditions such as sleep apnea.
- » **Distracted Driving**—NHTSA defines distraction as a specific type of inattention that occurs when drivers divert their attention away from the task of driving to focus on another activity. Distractions can be technological, such as using navigation systems and cell phones, or behavioral, such as interacting with passengers and eating.
- » **Vehicle operation**—The greater the rate of speed at which a vehicle is operated, the greater the chances for death or serious injury resulting from a crash. Higher vehicle speeds also mean an increase in stopping distance. Speed-related fatalities and injuries result from crashes where a driver was either driving over the posted speed limit or at an unsafe speed for conditions.

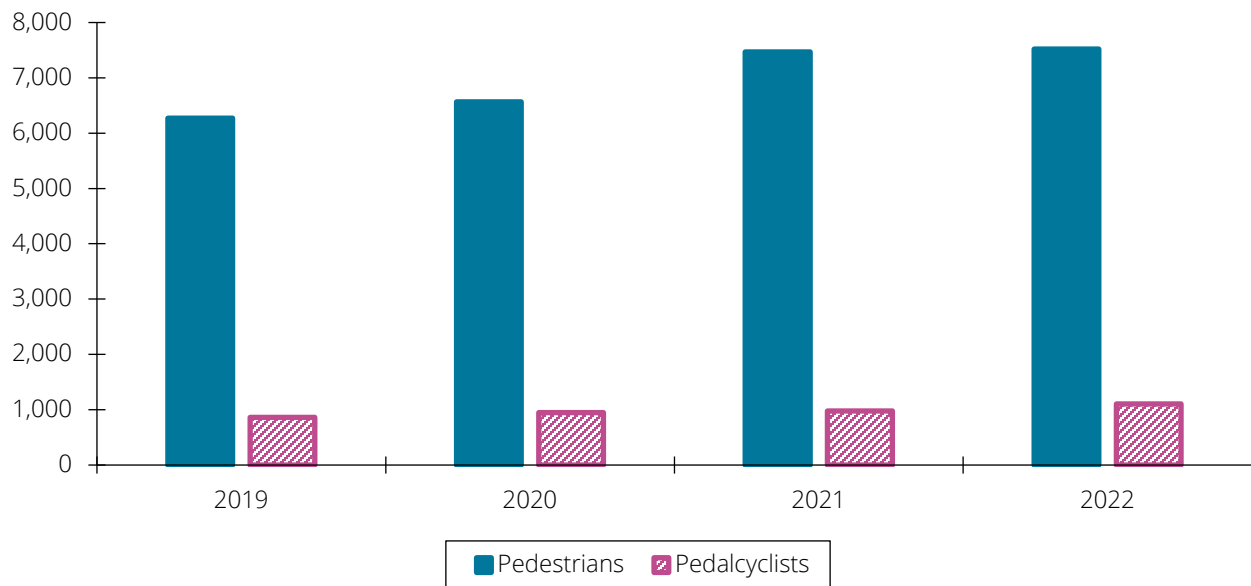
- » **Age-Related Risks**—NYS' Strategic Highway Safety Plan (SHSP) defines young drivers as those 20 years old and younger. Drivers 65 and older represent the older driver group. Nationally, older and younger drivers have higher crash rates per VMT. For young drivers, higher rates of crash involvement are often attributed to inexperience and/ or an increased propensity for risk taking. For older drivers, diminishing abilities and crash survivability are key factors to consider.

PEDESTRIAN AND BICYCLIST FATALITIES AND INJURIES

As shown in Figure 4.5 above, in 2022, 20 percent of motor vehicle crash fatalities nationally involved pedestrians (18 percent of total) or cyclists (2 percent of total) as victims. According to NHTSA, cyclists are bicyclists and other cyclists including riders of two wheel, nonmotorized vehicles, tricycles, and unicycles powered solely by pedals. 2022 fatalities in these categories totaled 8,627 victims.

NHTSA reported 6,205 pedestrian and 859 cyclist fatalities in traffic crashes nationwide in 2019. Totals increased in the 2020 pandemic year to 6,565 pedestrians and 948 cyclists, increases of 5 percent and 10 percent, respectively, despite lower VMT that year. 2021 saw a further 14 percent increase over 2020 pedestrian fatalities to 7,470 and 3 percent increase in cyclists killed to 966. By 2022, 7,522 pedestrians were killed nationally, less than 1 percent increase over 2021 and 1,105 cyclists killed, just over 13 percent higher than in 2021. In 2022, pedestrian traffic crash fatalities were 20 percent higher than those in pre-pandemic 2019 and cyclist fatalities were 29 percent higher than 2019 levels.

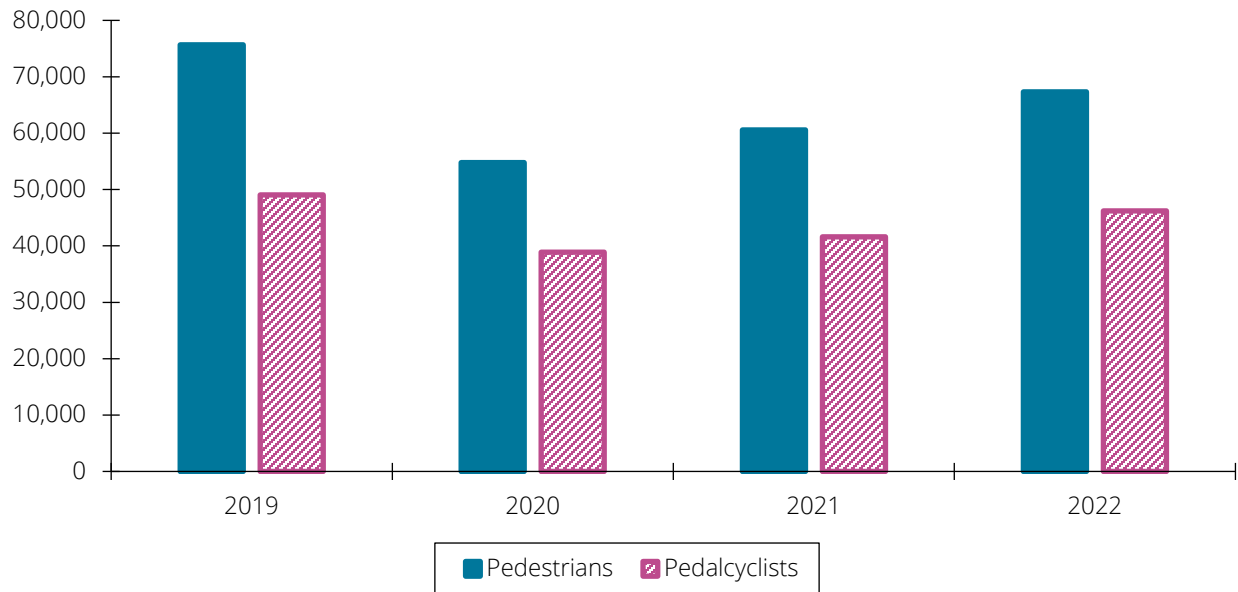
Figure 4.9 National Pedestrian and Cyclist Fatalities



Source: NHTSA National Statistics.

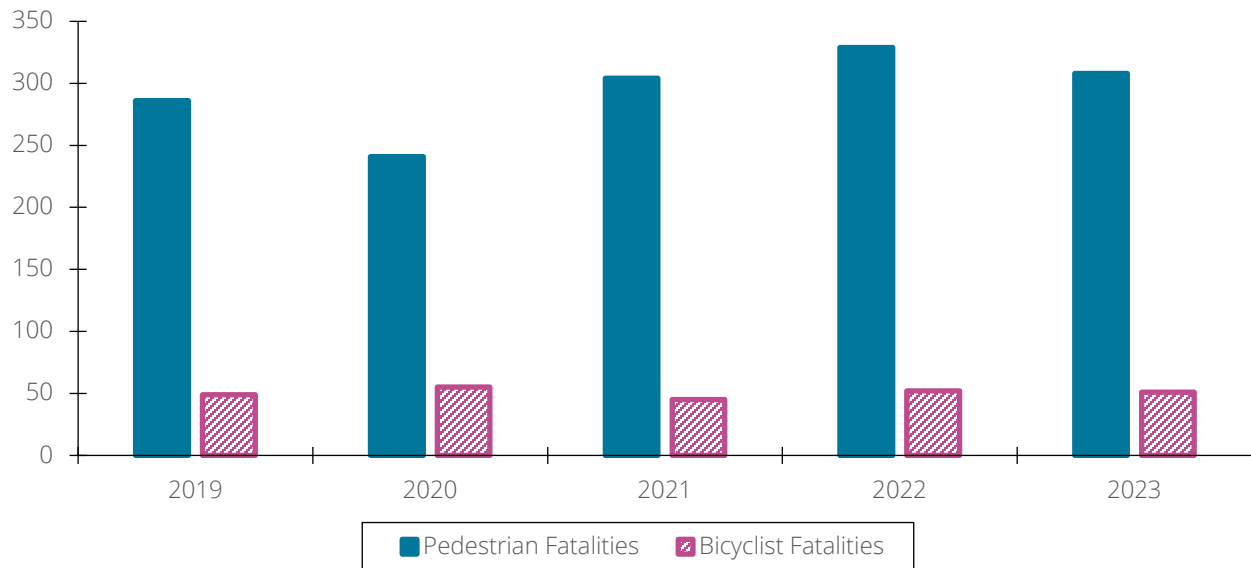
In 2019, 75,650 pedestrians were injured in traffic crashes while 49,057 cyclists were injured. The 2020 pandemic year saw these numbers decrease to 54,771 pedestrians injured, a drop of 28 percent, and 38,886 cyclists injured, a decrease of 21 percent. 2021 saw a 10 percent increase to 60,579 pedestrians injured and a 7 percent increase to 41,615 cyclists injured. Finally, in 2022, injured pedestrians numbered 67,336, an increase of 11 percent, while injured cyclists rose 11 percent to 46,195. However, despite the increases, 2022 pedestrian injuries were 11 percent below pre-pandemic levels in 2019, while 2022 cyclist injuries were 6 percent below the number in 2019.

Figure 4.10 National Pedestrian and Cyclist Injuries



Source: NHTSA National Statistics.

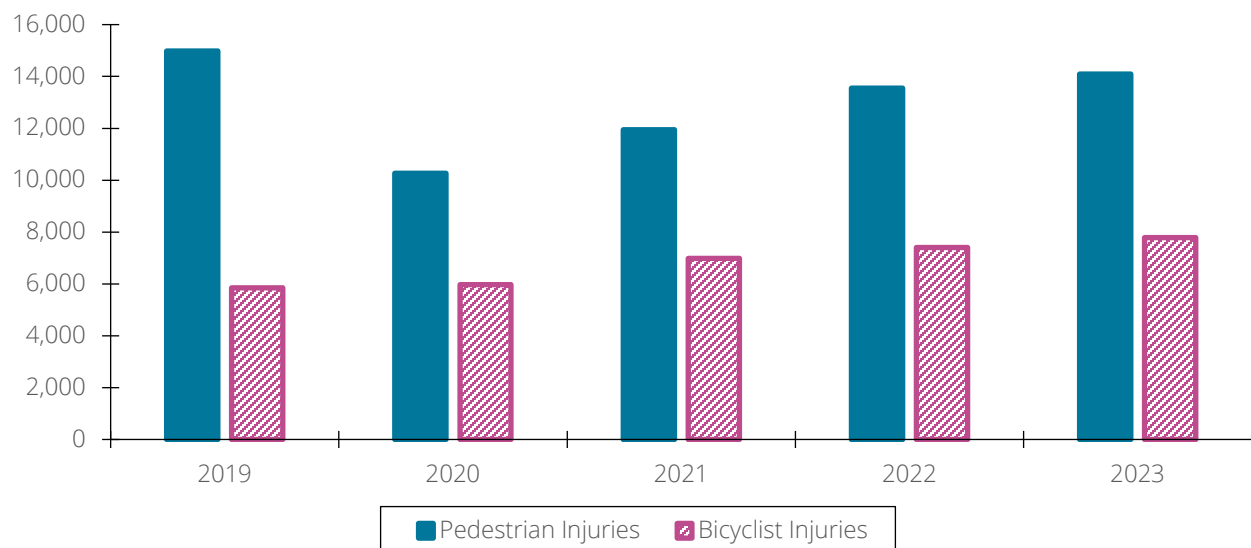
Figure 4.11 shows NYS pedestrian and bicyclist fatalities, and crash patterns differ somewhat from those for the country. Pedestrian fatalities dropped in the pandemic year by 16 percent and bicyclist fatalities increased in the pandemic year by 12 percent. Nationally, pedestrian fatalities increased in the pandemic year. Unlike the increasing trend in fatalities after the pandemic year nationally for both pedestrians and cyclists, NYS these levels saw both increases and decreases during the period 2021–2023. Nationally, cyclist injuries dropped 21 percent in the pandemic year and increased every year thereafter, although in 2022 they were still 6 percent lower than the pre-pandemic level in 2019.

Figure 4.11 New York State Pedestrian/Bicyclist Fatalities

Source: Institute for Traffic Safety Management & Research.

Looking at NYS pedestrian and bicyclist injuries, Figure 4.12 below presents these trends, which again show variance with the national trends presented above. Pedestrian injuries decreased in the pandemic year by nearly 32 percent, mirroring the national 28 percent drop in pedestrian injuries in the pandemic year. NYS pedestrian injuries increased every year thereafter until in 2023 they were only 6 percent less than the level in 2019. In contrast, NYS bicyclist injuries increased over 2019 levels in every subsequent year, including the pandemic year. By 2023, bicyclist injuries were 33 percent higher than in 2019.

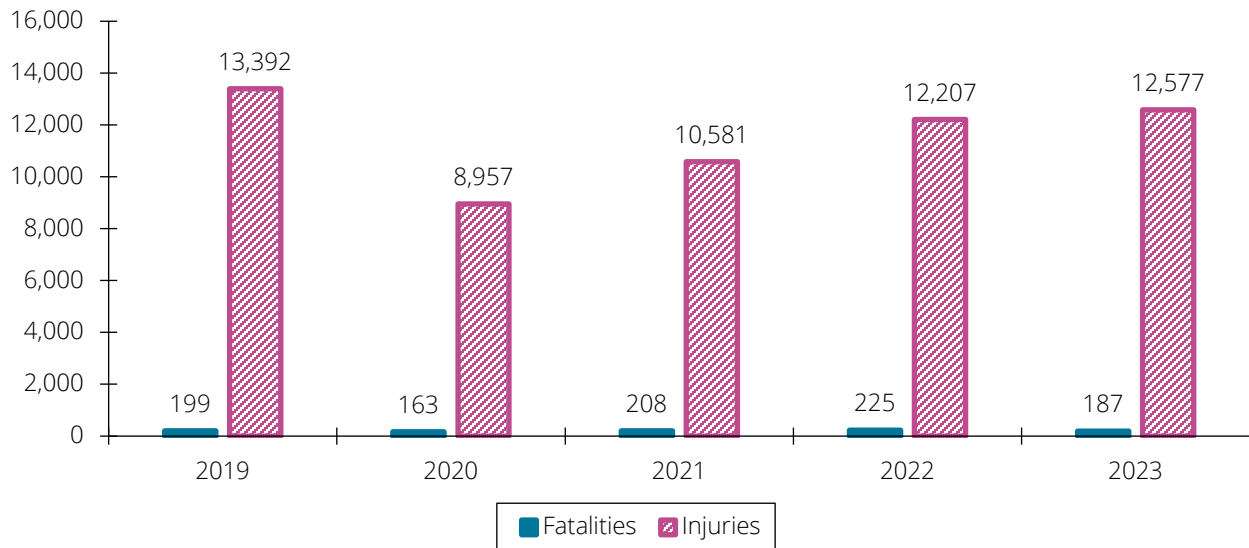
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Figure 4.12 New York State Pedestrian/Bicyclist Injuries

Source: Institute for Traffic Safety Management & Research.

In 2019, NYMTC's planning area saw 199 pedestrian fatalities, while 13,392 pedestrians were injured. The pandemic year of 2020 saw these levels drop significantly, by 18 percent to 163 pedestrian fatalities and by 33 percent to 8,957 pedestrian injuries. Pedestrian fatalities increased in both 2021 and 2022 by 28 percent and 8 percent, respectively, before falling again in 2023 by 17 percent. Pedestrian injuries increased in all three subsequent years by 18 percent, 15 percent, and 3 percent respectively (Figure 4.13).

Figure 4.13 NYMTC Planning Area Pedestrian Fatalities and Injuries



Source: Institute for Traffic Safety Management & Research.

PEDESTRIAN AND BICYCLIST SAFETY FACTORS

Total crashes involving cyclists and pedestrians in the NYMTC planning area reached a 10-year low in 2020 following mandatory stay at home orders at the onset of the COVID-19 pandemic but quickly surged back up reaching a 10-year high in 2022. As discussed in the Active Transportation Plan, Appendix C, the vast majority (88 percent) of all bicycle and pedestrian crashes, and nearly three quarters (73 percent) of fatal bicycle and pedestrian crashes in the NYMTC planning area, occurred at or near an intersection. This is a strong indication of a broad design context that presents significant safety challenges for walkers, bikers, and micromobility users in the roadway. Specifically, lack of visibility at crossings, poor state of good repair, limited lighting, wide crossings with no median refuge, and other factors can all contribute to conflicts between motorized vehicles (cars, trucks, buses) and active modes.

The emergence of micromobility technologies and conveyances across the NYMTC planning area has expanded the scope and scale of active transportation, contributing to the increasing crash trends. The FHWA broadly defines micromobility as any small, low-speed, human- or electric-powered transportation device, including bicycles, scooters, electric-assist bicycles, electric scooters (e-scooters), and other small, lightweight, wheeled conveyances that do not require a license or registration like cars, motorcycles, or mopeds. Many micromobility trips are taken as part of shared systems run by private operators, and rider familiarity may vary. Additionally, these conveyances often use bicycle lanes given travel speeds upwards of 20 miles per hour, which is too fast to comfortably share space with pedestrians. Insufficient regulation,

difficulty, and inconsistency in enforcement, differing modal speeds, varying micromobility familiarity, driver education and attention, infrastructure design and operation, user visibility, and unsafe user behavior are causing further conflicts.

MOTOR VEHICLE, BICYCLE, AND PEDESTRIAN SAFETY ANALYSIS

In addition to the trend assessments and descriptions of current conditions for traffic crashes provided in the sections above, a supplemental analysis for geospatial identification of higher-risk locations using New York State DOT's Crash Location & Engineering Analysis & Reporting (CLEAR) system is shown in Figure 4.14, Figure 4.15, and Figure 4.16. These maps depict all fatal and serious injury crashes as a heat map showing the highest risk locations over three years (2021–2023) compared to unique locations of fatal and serious injury bicycle and pedestrian crashes.

Data from the ITSMR was used to identify the frequency and severity of crash-related deaths and injuries in NYMTC's planning area by contributing factor. Outside of fatalities caused by the "other" factor (which is a combination of different factors or unmarked), unsafe speed, pedestrian/bicyclist error/confusion, and driver distraction contribute to nearly 62 percent of remaining fatalities.

Figure 4.14 Fatal and Serious Injury Crashes in the NYMTC Region
from 2021 to 2023—New York City

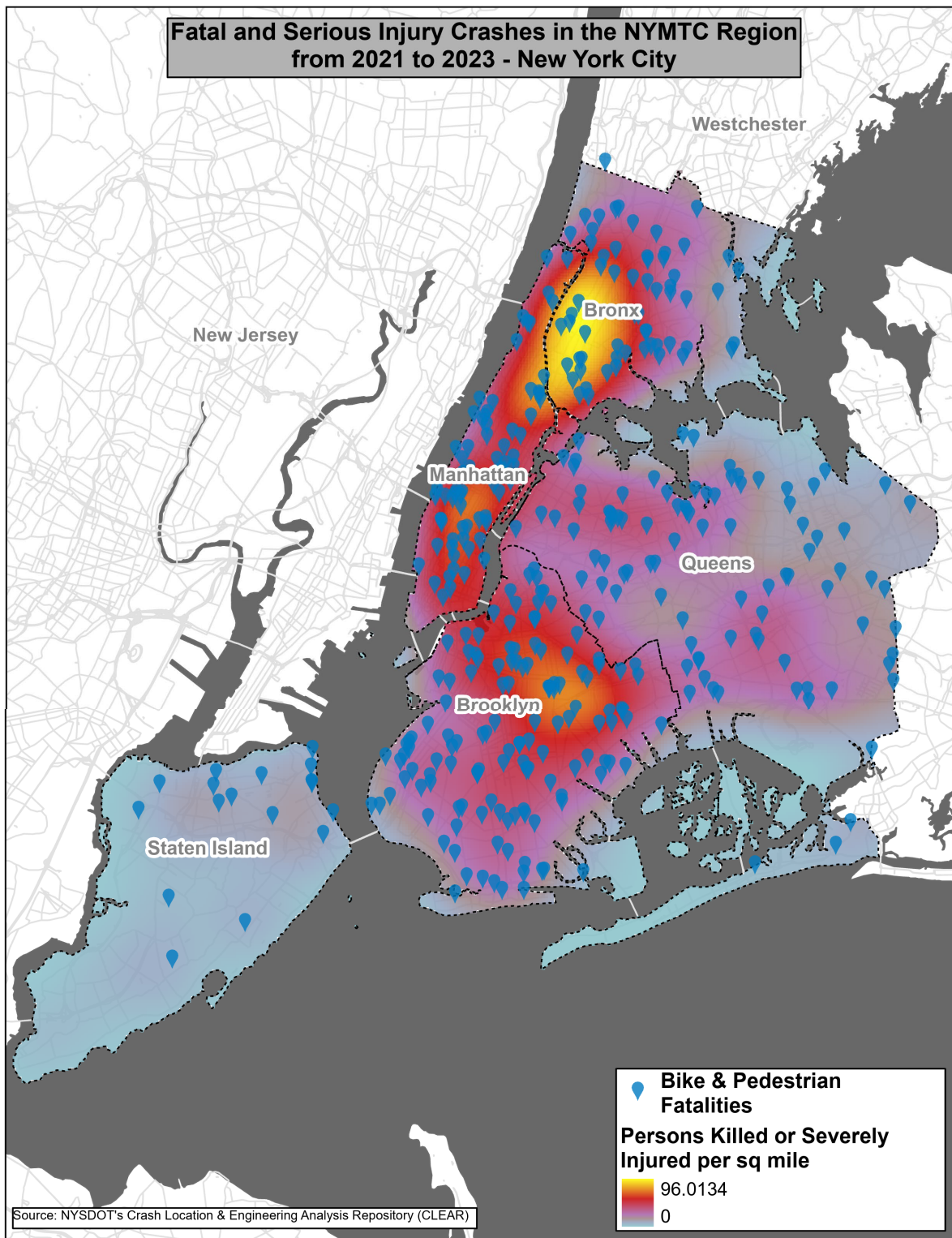
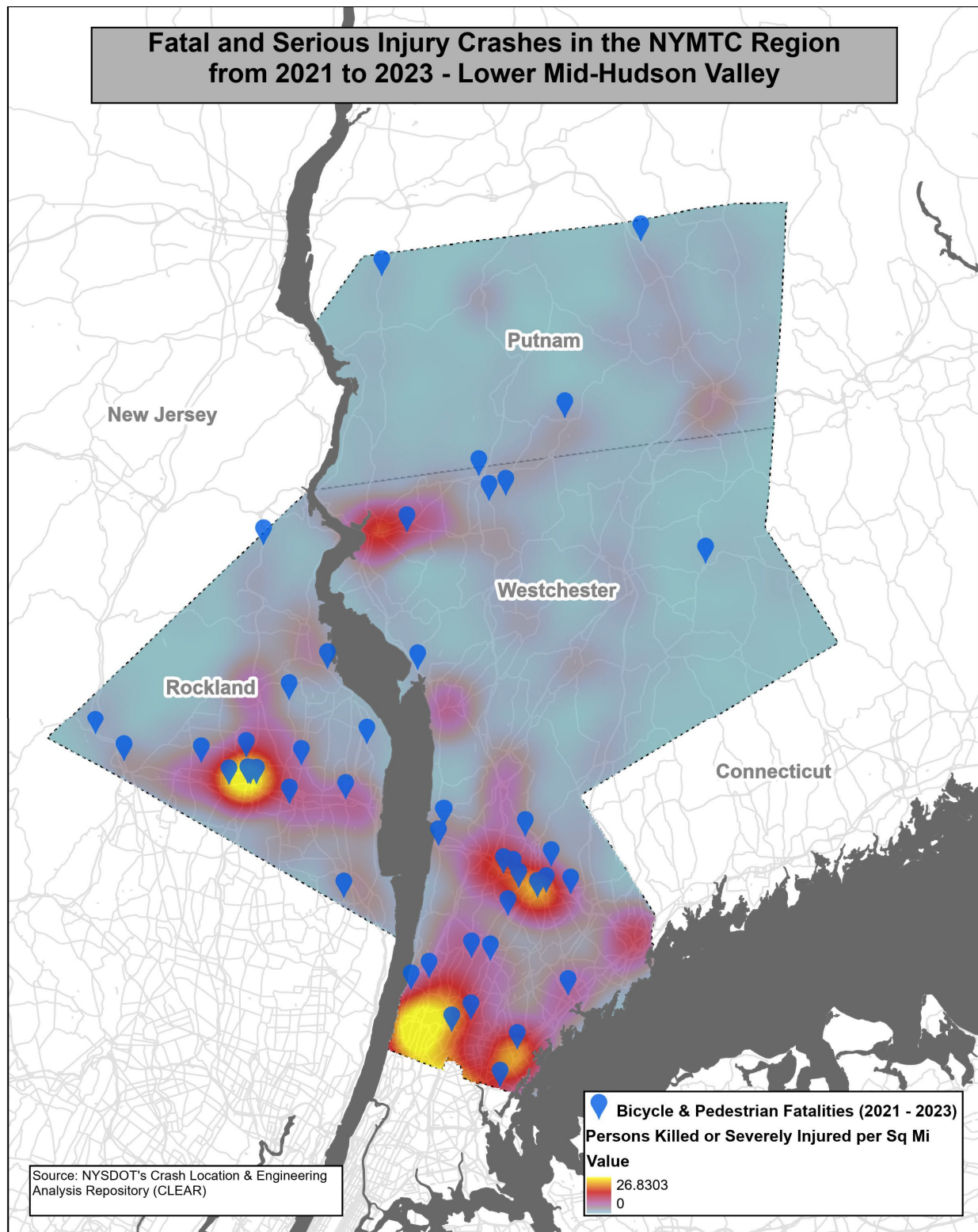
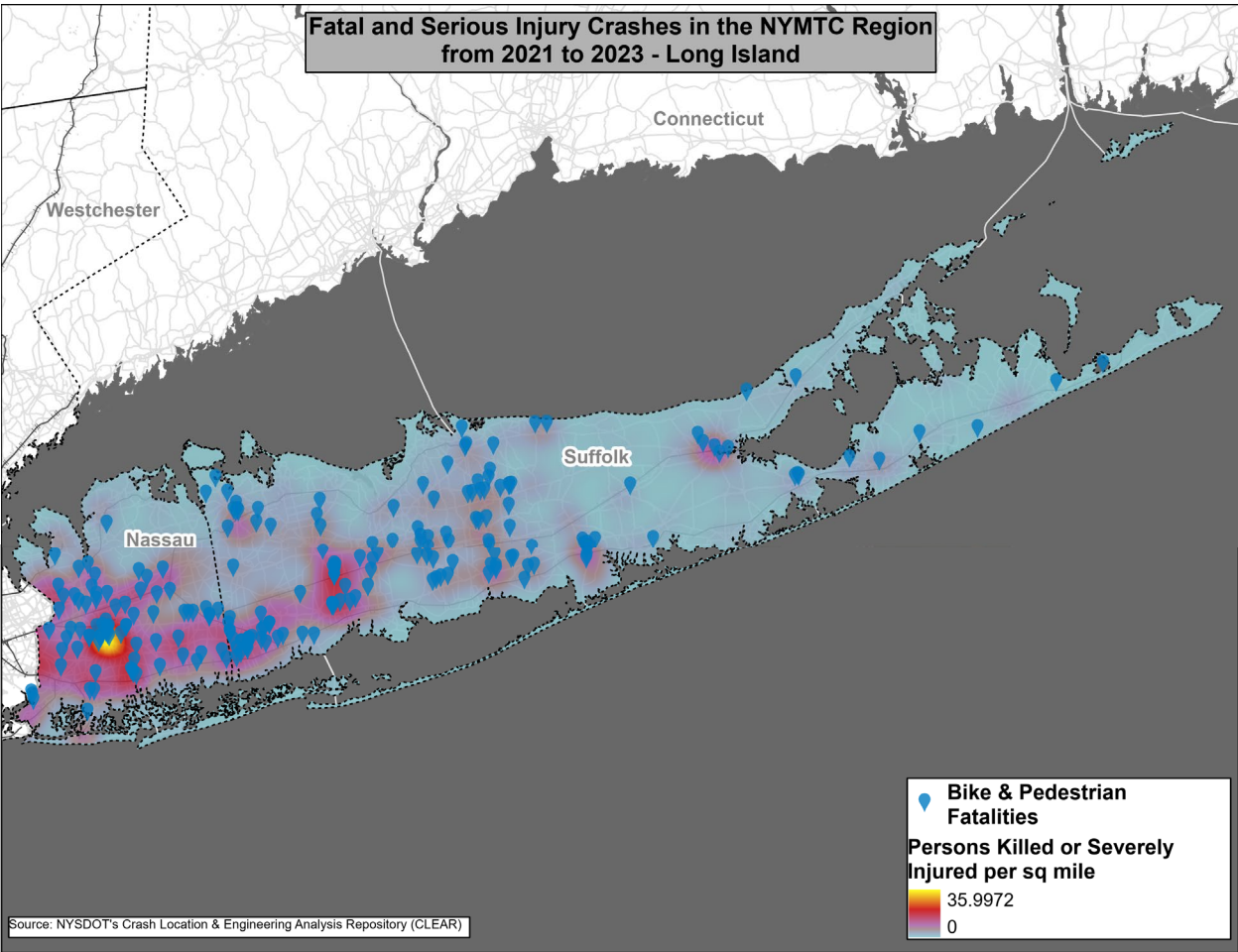


Figure 4.15 Fatal and Serious Injury Crashes in the NYMTC Region
from 2021 to 2023—Lower Mid-Hudson Valley



Source: NYSDOT's CLEAR.

Figure 4.16 Fatal and Serious Injury Crashes in the NYMTC Region
from 2021 to 2023—Long Island



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Source: NYSDOT's CLEAR.

Table 4.1 presents total fatality and injury rates per 10,000 population by county and borough from 2019 through 2023.

Table 4.1 NYMTC Planning Area—County/Borough Fatality and Injury Rates per 10,000 Population

County/Borough	2019	2020	2021	2022	2023
New York City					
Bronx	97.53	80.34	89.95	95.06	98.97
Kings	85.80	68.97	80.58	83.49	89.23
New York	61.03	46.07	57.23	59.63	62.99
Queens	100.35	72.68	82.70	88.18	100.41
Richmond	80.61	50.60	59.86	67.90	72.08
Long Island					
Nassau	116.63	82.64	96.73	107.90	108.68
Suffolk	110.67	80.80	95.71	91.54	99.15
Lower Hudson Valley					
Putnam	77.50	54.09	67.60	77.72	73.63
Rockland	85.55	62.35	69.13	80.38	85.62
Westchester	80.99	54.77	65.39	69.53	72.15

Source: Institute for Traffic Safety Management & Research.

PUBLIC TRANSPORTATION

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As described in detail in Chapter 2, an immense, interrelated system of bus and rail services provides public transportation in NYMTC's planning area across multiple providers and jurisdictions. The safety and security of passengers using these services are the responsibility of these service providers and the counties and municipalities that contract for the service. These services are policed by relevant local municipal departments, as well as by the New York State Police. The FTA's National Public Transportation Safety Plan, published in 2024, noted that transit fatalities and injuries remain a significant concern despite comprising less than one percent of total fatalities and injuries across the country's surface transportation network. Over the last six years, there has been a general national increase in the number and rate of major transit safety events and fatalities reported to FTA's National Transit Database (NTD).

Transit providers operating within NYMTC's planning area report to the NTD. These providers are also required to develop and submit Public Transportation Agency Safety Plans (PTASPs), which are FTA-required safety plans for transit providers receiving Federal funds. The plans include the processes and procedures to implement a Safety Management System (SMS), which is a systematic approach to managing safety. The plans also report on safety events as a basis for adopting safety-related performance targets. Table 4.2 presents a compilation of available public transportation safety data.

Table 4.2 NYMTC Planning Area: Public Transportation Safety Events and Fatalities

Year	Fixed Route		Paratransit	
	Major Events	Fatalities	Major Events	Fatalities
2019	211	3	16	0
2020	134	3	13	0
2021	134	3	7	0
2022	145	5	11	0
2023	192	1	12	0

Source: NYSDOT Public Transportation Bureau.

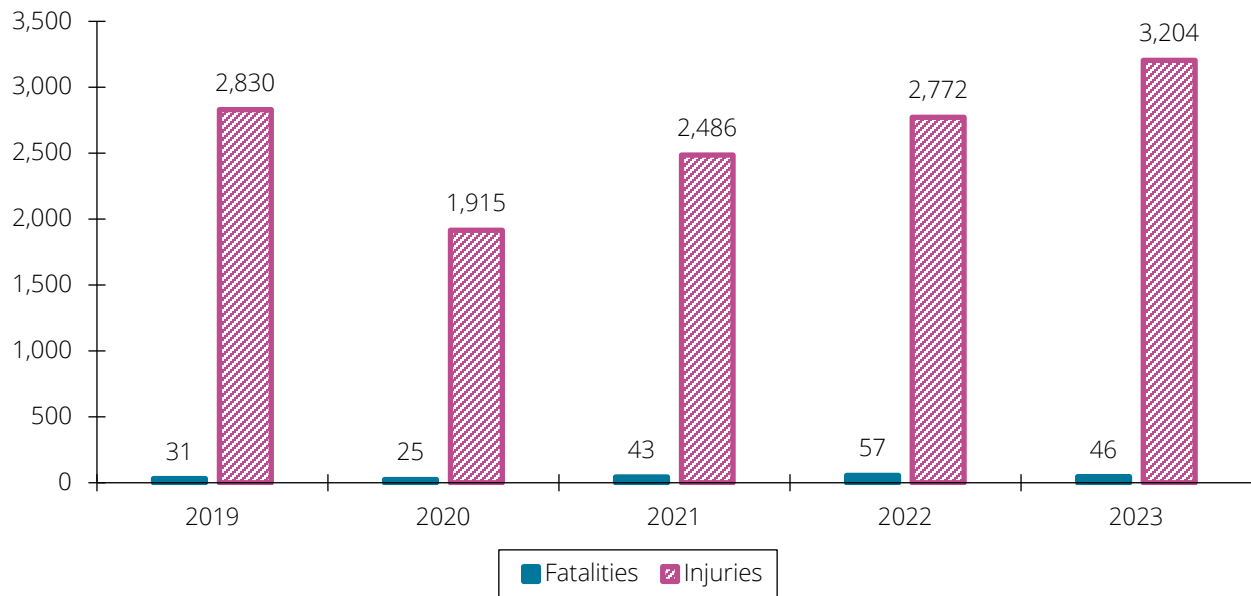
Note: Major events include incidents (including accidents and derailments) meeting reporting thresholds for transit rail, bus, and paratransit. These events may occur on transit right-of-way or infrastructure, or at a transit revenue facility, maintenance facility, or rail yard. They may take place during a transit-related maintenance activity or otherwise involve a transit revenue vehicle. Examples of these events include collisions, fires, derailments (mainline and yard) including non-revenue vehicles; hazardous materials spills; and acts of God.

FREIGHT TRANSPORTATION

In 2023 across NYMTC's planning area, 3,250 traffic crashes involving large trucks resulting in fatalities or injuries took place with 46 of which resulting in fatalities and represented 10 percent of traffic crashes involving fatalities. The remainder, 3,204 crashes, resulted in injuries, represented 4 percent of all traffic crashes resulting in injuries that year.

The 31 large truck crashes causing fatalities in 2019 were roughly 33 percent lower than injury crashes in 2023. This level dropped to 25 large truck crashes leading to fatalities in the 2020 pandemic year, after which there was a 39 percent increase over the pre-pandemic 2019 level to 43 crashes in 2021 and an 83 percent increase over 2019 levels in crashes involving fatalities to 57 crashes in 2022. The number of crashes moderates to 46 in 2023, which is still 48 percent higher than the number of crashes in 2019.

Regarding large truck crashes resulting in injuries, the pre-pandemic 2019 level of crashes (2,830 crashes) was 12 percent lower than those in 2023. The pre-pandemic crash level dropped 32 percent to 1,915 crashes causing injuries in the pandemic year. The pandemic year was followed by three years of annual increases above the previous year, 30 percent in 2021, 12 percent in 2022 and finally a 16 percent increase in 2023. Figure 4.17 presents these trends for both crashes involving fatalities and those involving injuries.

Figure 4.17 NYMTC Planning Area—Large Truck Crashes

Source: Institute for Traffic Safety Management & Research.

TRANSPORTATION SECURITY

Transportation security in the NYMTC planning area and the multi-state metropolitan region is the responsibility of many agencies and institutions. At the regional and local levels, disaster preparedness and emergency response planning are led by county, municipal, and local governments responsible for developing their own emergency management plans for their respective areas, and through New York State's Office of Emergency Management (OEM).

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EXISTING INITIATIVES

NYMTC as an organization, as well as its members, have various initiatives in place to address issues of safety and security in the NYMTC planning area. These initiatives address existing risks and consider the recommendations of various Federal agencies, including the NHTSA.

STATEWIDE AND REGIONAL SAFETY PLANNING

- » **Strategic Highway Safety Plan**—New York State's SHSP promotes best practices and strategies that have a substantial impact on reducing fatal and serious injury crashes. The SHSP is a major component of the Federal Highway Safety Improvement Program (23 USC Section 148) and is developed through a collaborative process involving public and private sector safety partners. The SHSP is intended to complement the other strategic planning processes undertaken in the state to meet Federal eligibility requirements for funding in specific program areas.
- » **Vulnerable Road User (VRU) Safety Assessment**—NYS was the first state in the Nation to complete a VRU Assessment, which identifies communities that will benefit most from targeted interventions to improve road safety outcomes for VRUs. According to the National Road Safety Strategy, VRUs are

road users not in a car, bus, or truck, generally considered to include pedestrians, motorcycle riders, cyclists, children seven years and under, the elderly, and users of mobility devices. In the event of a crash, these users have little to no protection from crash forces.

- » **Regional Transportation Plan Safety and Security Goal Module**—NYMTC's Safety and Security Goal Module in its RTP contains the enhancements needed for the existing applicable sections of the RTP to comprise a regional Safety Action Plan aimed at preventing roadway fatalities and serious injuries in a locality, Tribe, or region. Federal planning grant awards have also been made for more localized safety actions plans on Long Island (Nassau County, City of Long Beach, towns of Brookhaven and Huntington, and villages of Sea Cliff and Upper Brookville) and in the Lower Hudson Valley (cities of Mount Vernon, White Plains and Peekskill, Town of Kent, villages of Airmont, Mamaroneck and Pleasantville) at the time of this writing.

PEDESTRIAN AND BICYCLE SAFETY

- » **Pedestrian Safety Workshops**—NYMTC has hosted FHWA workshops on designing for pedestrian safety for local officials in its planning area. Workshop participants have learned about effective solutions and best practices in roadway design and operations for pedestrian safety, as well as the role that planning and street design play in providing safe pedestrian environments. Workshop participants have included engineers, planners, traffic safety and enforcement professionals, public health, and injury prevention professionals and, decision-makers looking for ideas and solutions for making changes to the physical environment that improve pedestrian safety.
- » **New York City Pedestrian Safety Study and Action Plan** is a comprehensive analysis of over 7,000 pedestrian crash records in NYC that resulted in serious injuries or fatalities, aiming to pinpoint the primary causes of these incidents and develop strategies to improve pedestrian safety across the city by implementing targeted interventions based on the identified issues.
- » **New York City's Vision Zero Pedestrian Safety Action Plans**—First released in early 2015 and updated in February 2023 with newer data. The plans describe the Vision Zero program and outline a framework for improving pedestrian safety. They also present a toolkit of engineering interventions and is NYC DOT's comprehensive approaches to address pedestrian fatalities and serious injuries in New York City.
- » **Pedestrian and Bicycle Safety in Nassau County**—This program teaches middle school children about general pedestrian and bicycle safety best practices. In addition, the New York Coalition for Transportation Safety (NYCTS) conducts pedestrian and bicycle safety education programs and events throughout Nassau County at schools, churches, senior centers; as well as at locations requested by elected officials.
- » **Pedestrian and Bicycle Safety in Queens, Nassau, and Suffolk Counties**—This program teaches school children K-12, adults, older adults, and people with disabilities about New York State Vehicle and Traffic Laws, traffic signs, roadway striping and the correct use of traffic control devices, and best practices for pedestrian and bicycle safety. Bicycle lanes, protected bicycle lanes, and bicycle routes are all defined, and examples of their usage are provided. Programs are conducted at

schools, churches, senior centers, business organizations, health, and wellness facilities in conjunction with trauma coordinators at all local hospitals.

- » **Safe-Streets-for-Seniors**—This pedestrian safety initiative is focused on older residents. Programs examine crash data and other variables such as senior trip generators, concentrations of senior centers, and senior housing locations, and develop and implement mitigation measures to improve the safety of seniors and all road users. NYC DOT has developed several Senior Pedestrian Focus Areas for implementation of safety projects; NYS DOT has several initiatives in Nassau and Suffolk counties; and Westchester County has a Livable Communities Collaborative for Aging Services that works on addressing senior pedestrian issues.

TRAFFIC SAFETY

- » **National Highway Traffic Safety Grants**—Federal grants to support state and community highway safety programs to reduce deaths and injuries. The Governor’s Traffic Safety Committee Highway Safety Strategic Plan sets priorities, directs program efforts, and assigns NYS resources.
- » **New York State’s Strategic Highway Safety Plan**—NYSDOT published the SHSP 2023–2027 update to continue to promote best practices and strategies that if implemented could have a substantial impact on reducing fatal and injury crashes.
- » **Wet Night Reflective Pavement Markings**—These pavement markings will be required on urban interstate highway segments to be treated within the next several years.
- » **New York City Vision Zero**—Implemented in 2014, New York City’s Vision Zero initiative is based on the premise that traffic deaths and severe injuries are preventable and can be systematically addressed rather than regarded as unavoidable “accidents.” Led by a coalition of New York City agencies, Vision Zero involves a comprehensive program of engineering, enforcement, and education. Current initiatives include:
 - » **Speed Management**—New York City has implemented the largest automated speed enforcement program in the United States. The citywide default speed limit was lowered to 25 miles per hour in 2014 in conjunction with the retiming of traffic signals to encourage following this limit. As of 2024, over 2,500 speed cameras are in operation in 750 school speed zones. Starting in 2022, speed cameras now operate 24 hours a day, seven days a week, year-round. In May 2024, Governor Kathy Hochul signed “Sammy’s Law,” allowing New York City to further lower the speed limit to 20 mph.
 - » **Street Improvement Projects**—NYC DOT has expanded capacity to make design interventions, including bicycle lanes, pedestrian islands, sidewalk and curb expansions, speed bumps and cushions, and left turn traffic calming installations that reduce the likelihood of crashes happening or the severity of those that do take place. NYC DOT installs about 100 of these projects per year.
 - » **Expansion of the Bicycle Network**—NYC DOT has built more than 500 lane miles of bicycle lanes since the start of Vision Zero.

- » **Focused Enforcement**—Vision Zero is a data focused initiative. As a result, the New York City Police Department has concentrated its traffic enforcement efforts on the offenses shown to injure and kill the most pedestrians and cyclists: speeding, failure to yield, disobeying stop signs and signals, cell phone usage (including texting), and improper turns.
- » **Schools-Based Safety Education**—These specialized programs for all ages of students teach safe pedestrian behavior and responsible motor vehicle operation and include “Alive at 25,” a partnership with the National Safety Council for new teenage drivers.
- » **Vision Zero Street Teams and High-Visibility Enforcement**—A partnership between NYC DOT and the New York City Police Department (NYPD), this initiative engages the public in areas around priority high crash corridors.
- » **Dusk and Darkness Driver Outreach**—This education and enforcement campaign addresses increased crash rates during evenings in the fall and winter months.
- » **For-Hire Vehicle Safety**—The New York City Taxi and Limousine Commission (NYC TLC) provides comprehensive safety training for its licensed drivers and enforcement of traffic laws by its team of officers. The Commission also provides annual recognition for the safest for-hire vehicle drivers, including those who have worked for multiple years without any violations or collisions.
- » **City Fleet Safety**—The New York City Department of Citywide Administrative Services (NYC CAS) provides defensive driving training to employees whose job responsibilities include driving a city-owned vehicle. The Safe Fleet Transition Plan has set out requirements for the purchase of safer vehicles for the New York City fleet. The fleet also has the country's largest program of side guard installations and telematics systems to monitor and address dangerous driving behaviors.
- » **Freight Safety Program**—The Freight Safety Program coordinates multiple data driven initiatives aimed at increasing the safety of the NYC freight sector. The program coordinates street improvements and educational interventions in areas of high numbers of truck crashes with large populations of VRUs. The program also supports task force meetings, media campaigns, and the distribution of educational literature, videos, and related resources aimed at increasing truck driver compliance within NYC and the region. The program oversees and advises on outreach initiatives about the dangers of large vehicle blind spots for the public. The program has also supported NYC efforts to promote safety technologies such as truck side guards through regulations, procurements, and education. As urban freight transport becomes more multimodal, the Freight Safety Program studies safety for other freight modes.
- » **Motorcycle Safety Program**—Similarly, the program includes educational outreach to motorcyclists and other road users to help improve motorcycle safety.
- » **Other Vision Zero programs** include safety education for senior citizens and commercial cyclists, bike helmet distribution programs, print media and radio communications campaigns targeting dangerous driving behavior, a truck safety task force, improved safety standards for trade waste vehicles licensed by or registered with the Business Integrity Commission, training for MTA bus drivers, collaborative public health research and data releases related to vehicle crashes, and targeted seizures of vehicles subject to outstanding judgments by the Office of the Sheriff.

- » **Westchester County's Community Traffic Safety Program**—The program educates the public and promotes safe driving behaviors to reduce the number of injuries and fatalities. The County's Plan4Safety Community Traffic Safety Awareness grant program, funded through the Governor's Traffic Safety Committee and NHTSA, is a community outreach program to bring the message of traffic safety and injury prevention to the community. The Police Traffic Services Block Grant provides funds to local Westchester police agencies and Westchester County Police to conduct traffic law enforcement for motorist violations based on agency jurisdictions' traffic and crash data.
- » **Police Traffic Services Block Grant Program**—Underwritten by the Governor's Traffic Safety Committee, this program funds communities in Rockland County to bring the message of traffic safety to residents. In May of each year, the Rockland County Sheriff's Office runs a special program called Buckle Up New York and conducts two major events annually for the Child Passenger Safety Program to ensure proper fitting and use of child car seats.
- » **STOP-DWI and Other State Programs**—These programs address impaired driving in five areas: education/public information, enforcement, court related, rehabilitation, and probation. In addition, several other programs address aggressive driving behavior and occupant protection, including the Selective Traffic Enforcement Program, Buckle Up New York, and Child Passenger Safety. Selective Traffic Enforcement Program encourages jurisdictions to use local data to identify problem areas and to develop enforcement countermeasures that reduce crashes, injuries, and fatalities. Buckle Up New York grants are for seat belt enforcement and compliance. Child Passenger Safety grants support child passenger fitting stations, training, and child restraint education.

MULTIMODAL PROGRAMS

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- » **High Crash Corridor Programs**—NYSDOT's "corridor approach" identifies systemic improvements to be implemented throughout a study corridor. Current corridor approach projects in Long Island include the Town of Brookhaven Pedestrian Safety Signal Improvements project. This project will include the implementation of Rectangular Rapid Flashing Beacon (RRFB), pedestrian signal upgrades, pavement markings, and the construction of ADA-compliant pedestrian ramps.
- » **Intersection Improvement Projects**—These range from adjusting the timing of traffic signals to reconstruction. Locations are evaluated considering such issues as accident history and pedestrian and vehicle traffic volumes to determine the best treatment to maximize pedestrian safety. Treatments include retiming traffic signals; adding crosswalks or upgrading existing crosswalks for higher visibility; restricting parking near the intersection; installing pedestrian signals; installing new signage; adding pavement markings in advance of a crosswalk; and adding pedestrian refuge islands and/or curb extensions.
- » **Safe-Routes-to-Transit**—A New York City initiative to improve pedestrian and motor vehicle movement around subway entrances and bus stops to increase access, safety, and convenience of mass transit. The program identifies high-priority locations through crash data analysis and transit rider counts. At high-priority locations, NYC DOT implements safety and accessibility improvements such as curb extensions, bus boarding islands, and sidewalk construction.

- » **Rail Crossing Safety**—According to the Federal Railroad Administration, a highway-rail grade crossing is a location where a public or private road, street, sidewalk, or pathway, intersects railroad tracks at the same level. At-grade rail crossings present a significant safety challenge. Current initiatives include:
 - Rockland County is pursuing a plan to install supplemental safety measures—primarily four quadrant gate systems—at 13 railroad grade crossings between Railroad Avenue and Andre Avenue along the West Shore (River) freight line where several accidents have occurred over the years. This project will improve safety and enable the County to pursue a Railroad Quiet Zone in this corridor.
 - MTA’s Long Island Railroad (MTA LIRR) and Metro-North Railroad (MTA MNR) have been working at either eliminating or improving the safety of at-grade crossings. As of 2024, MTA LIRR has 289 grade crossings throughout its system, all of which have safety delineators. A total of seven grade crossings have been eliminated or closed as part of the MTA LIRR Expansion Project.
 - MTA MNR’s and MTA LIRR’s TRACKS Programs are safety education community outreach programs designed to promote safe behaviors at or around railroad grade crossings and tracks. The objective of these programs is to educate as many drivers, passengers, pedestrians, and individuals that live and/or work in or around the communities that MTA railroads serve.
 - NYSDOT manages the Railway Highway Crossings Program, which provides Federal funds to eliminate hazards at grade crossings. The program focuses on improving safety at existing grade crossings primarily through the installation of warning devices, including installation or replacement of active warning devices (flashers and gates), track circuitry improvements, interconnections with highway traffic signals, and crossing surface improvements.
- » **Complete Streets**—On October 2011, Governor Andrew Cuomo signed the Complete Streets Law. The Complete Streets Law requires state, county, and local agencies to consider the needs of all roadway users when planning transportation projects that receive state and Federal funding.

PUBLIC TRANSPORTATION SAFETY

Transit providers in the NYMTC planning area have established safety programs to protect passengers, employees, revenues, and property.

- » **Public Transportation Agency Safety Plans**—According to the FTA, the Public Transportation Agency Safety Plans (PTASP) regulation (49 CFR Part 673) requires public transportation operators receiving Federal funds under the FTA Urbanized Area Formula Grants (Section 5307), and rail transit agencies subject to the FTA State Safety Oversight (SSO) program, to develop an Agency Safety Plan (ASP) that includes the processes and procedures to implement a Safety Management System (SMS). SMS is a comprehensive, collaborative, and systematic approach to managing safety.

COMMERCIAL VEHICLE SAFETY

As part of its Vision Zero safety programs, New York City hosts a truck safety task force with private industry fleets and holds an annual Fleet Safety Forum that brings together private and public fleet operators with safety advocates and technology providers to work together to improve fleet safety. New York City also maintains a Truck Safety Toolkit for vehicle operators and fleet owners. NYS Motor Carrier Safety Assistance Program promotes highway safety and reduces commercial vehicle related crashes and hazardous materials incidents by removing unsafe trucks, unsafe loads, and unqualified drivers from the highways.

TRANSPORTATION SECURITY

NYMTC members are involved in ongoing and coordinated efforts to protect the overall transportation system and respond as required to unforeseen natural events and disasters. Efforts include yearly participation in emergency simulations to train personnel. At the regional and local levels, disaster preparedness and emergency response planning are led by county, municipal, and local governments responsible for developing local emergency management plans as well as through the NYS OEM.

TRANSPORTATION SAFETY DATA

Transportation safety data is at the center of the evaluation of safety issues as well as planning and implementation of safety programs. Federal transportation legislation emphasizes a data-driven approach to safety planning, gathering and analyzing data, identifying needs, and investing safety funds accordingly.

Some of NYMTC's major tools/data systems used in safety planning include:

- » CLEAR Crash Data Viewer is an application provided by NYSDOT that is available to authorized users for the visualization, query, and analysis of crash data. The application provides users with pre-configured dashboards and reports, as well as robust query functionality allowing users to locate, search, visualize, and analyze crashes using both a tabular grid and interactive map display.
- » NYC DOT developed the Traffic Safety Data Viewer to allow easy access to detailed data by planners, analysts, and project managers in a user-friendly interactive map format. Users can display all injury and fatality data on a map of New York City or generate an analysis of the crash history for a given location. The Safety Data Viewer application provides functionality for post-implementation effectiveness analysis to allow a quick safety impact analysis of projects to inform future work. This feature outputs a tailored report that compares age, mode, time of day, and other crash characteristics.
- » The Governor's Traffic Safety Committee funded the Institute for Safety Management and Research to design and develop a traffic safety repository that is publicly accessible via the Internet. The Institute then built a system known as the Traffic Safety Statistical Repository that captures crash and police ticket data.

4.2.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contain the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Assess the Federal Aid roadway system using CLEAR and identify safety focus locations.
- » Review security-related funding requirements, programs, and funding sources.
- » SAWG to recommend prioritization approach for safe streets, intersections, railroad grade crossings and shared-use right-of-ways, and to establish road safety initiatives.
- » Undertake benchmarking research from other regions on safety management, training, education, and enforcement.
- » Undertake benchmarking research from other regions on operational safety and security; connected vehicle programs and policies; and driver assistance programs.
- » Gather input from members' operational staff and undertake an operational safety review as a discretionary study.
- » Consider a comprehensive assessment of connected vehicle programs and policies, and driver assistance programs based in part on New York City's pilot program.
- » Inventory current and developing technology that can be used to improve safety-related enforcement.

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Coordinate safety data collection through the MAP Forum.
- » SAWG to develop recommendations on the enhancement of the safety data program.
- » SAWG to develop a research approach to gathering safety input from the public.
- » SAWG to develop recommendations on the collection of grade crossing safety data.
- » Collect operational safety data from all NYMTC members.

PLANNING PROCESS RECOMMENDATIONS

- » SAWG to develop recommendations for considering safety and security in project selection.
- » SAWG to develop a more coordinated process for Highway Safety Improvement Program project selection.
- » SAWG to identify multi-agency safety initiatives.
- » SAWG to identify other relevant safety, security and enforcement agencies, and operational units, to bring into the process.

PROGRAM RECOMMENDATIONS

- » Implement the recommendations of the safety coordination study for the suburban counties and the safety aspects of the transit service coordination study.

4.2.5 PERFORMANCE MEASURES

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirements:

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

The performance measures designated for NYMTC's System Performance Report are detailed in Chapter 3 of *Moving Forward 2055*.



4.3 VISION GOAL—INFRASTRUCTURE

We seek to establish and maintain a transportation system for which infrastructure is maintained and improved in a sustainable manner.

4.3.1 DESCRIPTION

The infrastructure goal focuses on promoting measures that support safety, durability, resilience, environmental sustainability, and effective asset management. It also targets fostering a fair approach of the maintenance and improvement of the transportation system, increasing productivity, and maintaining competitiveness through contributions to improved mobility and accessibility.

4.3.2 OBJECTIVES

- » Maximize environmental/fiscal sustainability and minimize carbon intensity when maintaining, improving, modernizing, and/or replacing transportation infrastructure.
- » Reimagine and repurpose the assets that comprise the region's transportation infrastructure to reconnect communities and improve accessibility across all modes.
- » Rebuild, replace, and/or modernize needed transportation assets for passengers and freight.
- » Invest in the integration of the region's multimodal transit network.
- » Create efficient and environmentally sound freight networks, systems, and facilities.
- » Plan and manage work zones and Maintenance and Protection of Traffic programs to efficiently advance infrastructure upkeep.
- » Plan for the development and use of advanced technologies and materials.

4.3.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

Section 2.3 of Chapter 2 of *Moving Forward 2055* provides a detailed description of the transportation system in NYMTC's planning area as one of the most complex and heavily used global systems with critical components of regional and national transportation networks moving both people and goods. The share of these public transportation passenger trips is much higher than in other U.S. metro regions. More detail on the region's multimodal transportation system is available for viewing in the [Moving Forward 2055 Interactive Map](#).

SYSTEM PRESERVATION

The extensive transportation infrastructure in NYMTC's planning area must be continuously maintained and modernized. As infrastructure continues to age, preserving the transportation system is an ongoing challenge that includes:

- » Pavement maintenance, rehabilitation, and reconstruction.
- » Bridge maintenance, rehabilitation, and replacement.
- » Replacement of public transportation buses, vans, and rail cars.
- » Maintenance and preservation of other transit amenities, facilities, and equipment.
- » Preservation of other elements of the transportation system (including active transportation facilities).

In the longer term, Chapter 5 of *Moving Forward 2055* forecasts that preservation of the transportation system during the period of the Plan will absorb 89 percent of the funding expected to be reasonably available through the Plan's 2055 horizon year (\$684 billion of an available \$770 billion). This enormous need to preserve an extensive, aging, and complex network of transportation facilities and equipment in effect constitutes an overhead cost for the provision of mobility to people and goods. In addition, the fact that this infrastructure is spread out over three islands and a substantial section of the mainland—an area that is bisected by a large harbor and a major river—yields a web of water crossings that add substantially to system preservation needs.

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SYSTEM ENHANCEMENTS

As described in Section 2.2.4 of Chapter 2 of *Moving Forward 2055*, due to the continued regional growth across population, employment, and travel, several regionally significant improvements to the transportation infrastructure are needed despite the overarching system preservation costs. As represented in Chapter 5 of *Moving Forward 2055*, major New York City-focused projects include the second phase of the Second Avenue Subway in Manhattan, the Hudson Tunnel and various other trans-Hudson River rail and vehicular crossing improvements, the Interborough Express in Brooklyn and Queens, and commuter rail improvements involving Penn Station. Other system enhancements under consideration include several key north-south corridors on Long Island and east-west corridors in the lower Hudson Valley.

TECHNOLOGICAL DEVELOPMENTS

Recent shifts in technology within transportation are potential game-changers revolutionizing how people travel through a region, and infrastructure must adapt to meet new needs of future travelers.

DECARBONIZATION

Decarbonization is the process of significantly reducing or eliminating certain harmful pollutants from the atmosphere that pose public health and environmental risk. The term “decarbonization” generally captures

pollutants such as carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, nitrogen trifluoride, perfluorocarbons, and hydrofluorocarbons.

ELECTRIFICATION

Electrification converts an energy-consuming device, system, or sector from non-electric sources of energy to electricity. It is an emerging economy-wide decarbonization strategy. Electrification is not necessarily the goal, rather a means to achieving a community goal such as reducing pollution or lowering energy costs.¹

Electric vehicle adoption is increasing as the technology evolves and costs diminish. Continued growth will require attention to supporting charging infrastructure for vehicles propelled fully or partially by electric motors powered by battery packs. Compared to fossil fuel vehicles, EVs have greater energy efficiency, produce less pollution, and cost less to operate. However, there are still issues with the range of EVs, although technological evolution is gradually addressing the range issue.

In addition to personal vehicles, the first hybrid electric buses and taxis entered service in New York City in 1998 and 2005, respectively, while the first all-electric buses entered service in 2019.² As part of New York State's initiative to get more electric cars and trucks on the road, the Charge Ready NY program has supported the installation of over 4,000 charging stations.³ New York State has also revised regulations to clarify charging station ownership rules and supported research and demonstration projects on new EV technologies and policies.⁴

EXISTING INITIATIVES

There are several initiatives that are geared towards either maintaining or rehabilitating current transportation infrastructure throughout the NYMTC region. Examples of such programs follow.

- » **NYMTC Transportation Improvement Program (TIP)**—The majority (71 percent, \$15.958 billion) of Federal funding programmed in the FFYs 2026–2030 TIP is targeted to the preservation of the existing transportation system. Note, this percentage and amount does not account for unprogrammed Federal fund balances for system preservation or enhancement.
- » **MTA Capital Program**—The 2025–2029 Capital Plan is the largest capital investment of state of good repair in the MTA's history, with over 90 percent dedicated to rebuilding and improving the system.
- » **NYSDOT Five Year Capital Plan**—The infrastructure investments made through the Capital Plan are intended to create jobs while maintaining safety of the system; manage State infrastructure assets so that New York remains competitive; leverage State resources to generate billions in new construction and economic growth; and mitigate the impacts that future extreme weather events may have on New Yorkers and the State's economy.⁵
- » **New York City Ten-Year Capital Strategy**—The City's strategy over the next 10 years highlights its intention to make substantial investments in capital projects to advance fairness and account for neighborhood and citywide needs, and fiscally-responsible adaptation to City budget changes.⁶

- » **County Capital Programs**—Each of the suburban counties in NYMTC’s planning area provides funding for county-owned facilities and equipment, including county-owned roadways and bridges, as well as transit facilities and equipment.
- » **BridgeNY Program**—NYS makes Federal and state funding available for local governments to rehabilitate and replace bridges and culverts statewide. These strategic infrastructure investments provide unprecedented support for making the State’s communities more resilient to the impacts of extreme weather events, which not only enhances the safety and reliability of these structures but also facilitates regional and global economic competitiveness.⁷
- » **Suffolk County Bridge Preventative Maintenance**—Suffolk County has an overarching bridge preventive maintenance program that aims to extend the useful life of its current transportation infrastructure. The program includes repainting and corrective repairs, cyclical cleaning, and other measures to extend the useful life of its existing roadway infrastructure.
- » **Charge Ready NY 2.0**—Charge Ready NY 2.0 offers rebates to public, private, and not-for-profit organizations to install Level 2 EV charging stations at workplaces, multi-unit dwellings (multifamily properties) or public facilities owned and operated by municipal or state Government entities.⁸
- » **Westchester County Vehicle Charging Stations**—Westchester County is in the process of establishing vehicle charging stations at county-owned facilities. The County currently has electric charging locations at roughly 75 locations, but the number will rise in the near-term future. Westchester County also has a capital project that supports its municipalities by providing funding for electric vehicle charging locations.
- » **Rockland County** has various municipal and private charging stations throughout the County, most recently installed at the new Monsey Park and Ride Lot and Exit 14 Park and Ride. Future installations at county and state owned park and ride lots are being considered.

4.3.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contains the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs, and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Research less carbon-intensive sources of asphalt, tarmac, and concrete.
- » Perform benchmarking research of other reconnecting community projects across the country.
- » Research techniques and technologies for improving seamless integration between transit services.
- » Research techniques and technologies for improving freight systems efficiency and environmental sustainability.
- » Research techniques and technologies for improving work zone and maintenance and protection of traffic programs

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Compile a central database of infrastructure conditions to use as a basis for system preservation projects.
- » Compile a database of active work zones in the planning area.

PLANNING PROCESS RECOMMENDATIONS

- » Incorporate environmental/fiscal sustainability considerations into project selection.
- » Identify candidate infrastructure components and communities for repurposing.
- » Consideration of infrastructure conditions by the transportation coordinating committees.
- » Pursue the recommendations of the Transit Service Coordination Needs Assessment.
- » Pursue the recommendations of the Clean Freight Corridors Planning Study and the Regional Waste Movement Study.

PROGRAM RECOMMENDATIONS

- » Continue lifecycle replacement of existing transit fleets with low or zero-emission vehicles.
- » Utilize available Federal discretionary funding sources to address candidate infrastructure.
- » Maintain system preservation emphasis within project selection for relevant Federal fund sources.
- » Explore additional service integration opportunities through the Transportation Systems Management and Operations (TSMO) Working Group and Metropolitan Mobility Network.
- » Explore additional freight system integration opportunities through the PFAC Freight Subcommittee and Multi-State Freight Working Group.

4.3.5 PERFORMANCE MEASURES

PERFORMANCE METRICS

In Chapter 3 of *Moving Forward 2055*, a System Performance Report, required by Federal law through [23 CFR 450.324](#), describes the condition and performance of the transportation system, identifies relevant performance targets, and reports on current progress in meeting the targets. It addresses the federally required performance measures and targets for highway safety, bridge condition, pavement condition, highway system performance, freight reliability, congestion and emissions, transit asset management, and transit safety. The infrastructure-related performance measures identified in Chapter 3 will be used to measure progress toward this Infrastructure goal and its objectives.



4.4 VISION GOAL—RESILIENCE

We seek to establish and maintain a transportation system for which resiliency is supported through mitigating, adapting to, and responding to chronic and acute stresses and disruptions.

4.4.1 DESCRIPTION

This goal seeks to enhance the transportation system's resilience to stressors and disruptions that will have a growing impact across the region in the longer term. These include sea level rise, and more frequent extreme weather; related impacts such as power outages and transportation disruptions; human-caused stressors such as cyberattacks and acts of terrorism; and public health emergencies. The goal also seeks to inform the ongoing recovery process from past and current stresses and disruptions through feasible, cost-effective strategies to reduce and manage vulnerabilities, advance the state of knowledge, and develop methods to assist agencies in the region to plan and invest for long-term, "all hazards" resilience.

4.4.2 OBJECTIVES

- » Protect and fortify major transportation assets.
- » Invest in extreme weather vulnerability analyses and material solutions for transportation assets.
- » Improve regional coordination on emergency and long-term responses to systemwide extreme weather impacts and sea level rise.
- » Enhance the transportation network's resiliency by increasing travel options and redundancies.
- » Collaborate on resiliency projects that have significant transportation implications.
- » Coordinate across jurisdictions to advance resiliency and sustainability.
- » Prioritize resiliency and sustainability in a manner that considers the needs of designated Communities of Concern.
- » Invest in future energy infrastructure to minimize the impact of grid events and supply chain disruptions on the transportation system and its users.
- » Promote resiliency strategies that account for environmental determinants of health and their impact on vulnerable communities.

4.4.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

ENVIRONMENTAL AND EXTREME WEATHER STRESSORS

The transportation assets in the NYMTC planning area have differing levels of protection from environmental and extreme weather stressors and disruptions. A defining extreme weather event took place in October 2012, when a "post-tropical" Hurricane Sandy, also known as "Superstorm Sandy," caused catastrophic damage to transportation assets in the multi-state metropolitan region. Sandy's storm surge, which coincided with the highest tide of the month, caused sea levels along the New Jersey coast, on Staten Island and in Brooklyn and lower Manhattan, and on Long Island's south shore to rise higher than recorded history. Many critical transportation facilities were inundated, transit services were suspended, and roadway facilities were shut down. The storm impacted the reliability of the region's multimodal transportation system.

Since that time, the fortification of transportation facilities and equipment has become a particular focus of owners and operators of transportation services and facilities. New York State, New York City, suburban counties, local municipalities and public authorities such as the MTA, New York State Thruway Authority, and the Port Authority of New York and New Jersey (PANYNJ) have all expended resources to address vulnerabilities laid bare by Sandy and other extreme weather events.

In recent years, additional extreme weather stressors have impacted the transportation system. Remnants of Hurricane Ida dropped over 3.1 inches of rain in an hour in 2021, causing flash flood emergencies and significantly inundating portions of the New York City subway system. Highways and rail lines across the NYMTC planning area were also flooded. Beyond rainfall, the storm brought wind damage that downed trees and blocked roadways and rail lines. Other recent intense storm events have had similar impacts, including tropical storms Elsa and Ophelia, as well as instances of severe thunderstorms bringing torrential rain to portions of the region. Most recently, severe thunderstorms created significant roadway damage in Suffolk County on Long Island.

These examples of severe weather events over the last two decades created different stressors for the transportation system in the multi-state metropolitan region. Taken together, these storms illustrate a range of environmental and climate resiliency issues that have significantly altered the transportation planning process.

EXTREME WEATHER AND SEA LEVEL RISE RISK ANALYSIS

The FHWA joined with NYMTC, the North Jersey Transportation Planning Authority (NJTPA), and the South Western Region Metropolitan Planning Organization (SWRMPO) as well as the Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO) of southwestern Connecticut to undertake the Post Hurricane Sandy Transportation Resilience Study, known as the Post Sandy Study, for New York, New Jersey, and Connecticut. This study was intended to enhance the multi-state metropolitan region's resilience to/sea level rise and extreme weather in the longer term, while informing the ongoing recovery process from Superstorm Sandy. The results of the study were released in 2017.

The Post Sandy Study compiled information on damage and disruption brought by Sandy in 2012 and Hurricane Irene, Tropical Storm Lee, and the Halloween Nor'easter of 2011 on the region's transportation system. The impacts of these four extreme weather events varied across the region and considering them together provided a wide range of potential extreme weather-related consequences for the transportation system. The study also compiled future projections and continuously monitored updates from the scientific community.

With an understanding of these impacts and projected future weather conditions, the Post Sandy Study assessed the exposure of the transportation system to extreme weather stressors at a regional scale, developing information that can be used by transportation agencies to advance more detailed vulnerability and risk assessments. These stressors included storm surge, wind, rainfall, and snowfall. Transportation system vulnerability experienced for each of these stressors was detailed throughout NYMTC's planning area.

COORDINATION ACROSS JURISDICTIONS

The MAP Forum is a consortium of ten metropolitan planning organizations and councils of Government—including NYMTC—in New York, Connecticut, New Jersey, and Pennsylvania which seeks to better coordinate planning activities in the multi-state metropolitan region. Since the disruptions brought by Superstorm Sandy, the MAP Forum has maintained a Multi-State Resilience Working Group which builds on *The Post Sandy Study* in the multi-state metropolitan region.

ENERGY INFRASTRUCTURE AND TRANSPORTATION

Major power generating stations, electrical substations, emergency backup generators, oil refineries, fuel storage facilities, and other critical components of the region's electrical and fuel distribution system have been disrupted by the extreme weather described above, with associated impacts on the transportation system. Disruptions to energy provision and availability have impacted traffic control, vehicle charging and fueling, communications with the traveling public, and the provision of transportation services.

HUMAN AND PUBLIC HEALTH STRESSORS

Facilities and conveyances that draw people to concentrated locations also make these locations attractive targets for disruptive cyberattacks and acts of terror aimed at mass casualties. As noted by the Mineta Transportation Institute:

Open to relatively easy penetration, trains, buses, and light rail systems offer an array of vulnerable targets to terrorists who seek publicity, political disruption, or high body counts. High concentrations of people in crowded quarters are inviting fodder for those who would cause mayhem and death. The massive amounts of explosives needed for truck bombs are unnecessary in crowded train stations, bus depots, carriages, or coaches. Even without large numbers of casualties, disruptions to transit can seriously impact a region's economy and the public's faith in the Government's ability to provide basic protections to its citizens.

Additionally, the public health emergency provoked by the COVID-19 pandemic revealed the organizational risks and vulnerabilities for transportation agencies, facilities operators, and service providers, as well as supply chain, surface transportation and other modal vulnerabilities.

The extreme weather-related stressors described above also have public health impacts. For example, the possibility of power outages in extreme weather can impact the ability of populations to access cooling, get away from flooding, in addition to other urgent, yet vital needs. Extreme heat could also have health impacts for users of transportation services. Public health impacts are often not uniform across society or across the planning area. Vulnerable communities are Communities of Concern (CoC) based on their socioeconomic and demographic characteristics and have been found to experience greater public health impacts based on location, available transportation and financial services, as well as surrounding land uses. *Moving Forward 2055* Appendix G, Title VI Assessment, defines and identifies CoC's in the NYMTC planning area.

CYBERSECURITY

As the transportation system and its components become increasingly automated and interconnected through the Internet, new potential stressors related to cyber manipulation emerge which will affect the operation of those components. Further, the ongoing technological development and transformation of the transportation system and the way people and goods move around heighten the potential for cyber manipulation of the system and of various conveyances.

Transportation is becoming more connected and dependent on advanced computing systems and software. Exciting next generation communications technology will soon be deployed on the Nation's roads and highways. Using connected vehicles to exchange information in real time with nearby vehicles and infrastructure will make travel safer, cleaner, and more efficient.

The U.S. DOT has identified the vital role of cyber security across exploring the potential of connected vehicles and other advanced technologies. U.S. DOT has focused on protecting systems, devices, components, and communications from malicious attacks, unauthorized access, damage, or anything else that might interfere with safety functions.

EXISTING INITIATIVES

ENVIRONMENTAL AND EXTREME WEATHER STRESSORS

Frequent extreme weather events, and the impacts of rising sea levels have influenced policy development across the multi-state region to address the wide range of effects associated with storm surge, heavy rainfall, wind, and the resulting erosion and flooding. The following examples show diversity across recovery and resiliency planning efforts led by communities throughout the NYMTC planning area:

NEW YORK STATE

- » New York State's OEM has standardized categories for hazard mitigation to serve as a foundation for strategy assessment.

- » New York State's Community Risk Reduction and Resiliency Act (CRRRA) requires decisionmakers to use the best available science to proactively consider sea level rise, storm surge, and flooding when issuing certain state funding and permits. State agencies are required to assess potential future risks related to storm surge, rising sea levels, and any other extreme weather conditions when making certain permitting, funding, and regulatory decisions.
- » The NYS2100 Commission, appointed after Superstorm Sandy, released its report in early 2013. The Commission's report includes recommendations on strengthening and increasing the resiliency of the state's infrastructure through short- and long-term strategies. The sectors addressed include transportation, land use, energy, insurance, and infrastructure financing. The report also includes cross-cutting recommendations that are common to these sectors.
- » Climate Smart Communities (CSC) is a New York State program that supports local governments in leading their communities to reduce pollution, adapt to the effects of extreme weather events, and thrive in a green economy. The benefits of participating include leadership recognition, free technical assistance, and access to grants. Local governments participate by signing a voluntary pledge and using the CSC framework to guide progress toward creating attractive, healthy, secure, and livable communities..
- » Under the auspices of the New York State Office of Resilient Homes and Communities (formerly the Governor's Office of Storm Recovery), two projects—one on Long Island and one on Staten Island—were funded under the U.S. Department of Housing and Urban Development's innovative Rebuild by Design competition. Other Rebuild by Design funded projects in New York City include The BIG U in Lower Manhattan and Hunts Point Lifelines in the Bronx.
- » The New York State Office of Resilient Homes and Communities also administers the New York Rising Community Reconstruction Program which covers housing and small business recovery, community reconstruction, and infrastructure components. The housing recovery initiatives include a Buyout and Acquisition Program. The Buyout Program improves the resilience of the larger community by transforming parcels of land into wetlands, open space, or stormwater management systems to create a natural coastal buffer to safeguard against future storms. The coastal buffer areas are intended to address those who live in areas that regularly put homes, residents, and emergency responders at high risk because of repeated flooding.
- » The NYSDOT has updated its design standard for new construction. As part of this policy, culverts and bridges in the Eastern half of New York State are being designed to handle 20 percent increases in streamflow from runoff events associated with severe storms. NYSDOT will also consider potential impacts stemming from sea level rise by utilizing guidelines prepared by the New York State Department of Environmental Conservation (NYSDEC).⁹
- » NYSDOT has refined its emergency responses and incorporated lessons learned into many practices, from maintenance management to programming, project selection, and managing assets.
- » New York State's Climate Leadership and Community Protection Act goals include cultivating healthy and resilient communities.

NEW YORK CITY

- » New York City's Neighborhood Coastal Flood Protection Projects, including:
 - East Side Coastal Resiliency is an integrated flood protection system that will span 2.4 miles along the east side of the Lower Manhattan waterfront, from Montgomery Street north to E. 25th Street. The project combines floodwalls, the elevation of East River Park, floodgates, and interior drainage infrastructure improvements.
 - The Battery Coastal Resilience is a project to rebuild and elevate the wharf promenade in the Battery to protect it from sea level rise in the year 2100.
 - Brooklyn Bridge-Montgomery Coastal Resiliency will provide critical flood protection in the Two Bridges neighborhood with a series of deployable flip-up gates and floodwalls, while also maintaining access and visibility to the waterfront.
 - Red Hook Coastal Resiliency aims to reduce flood risk due to coastal storm surge and sea level rise along Red Hook's waterfront while also integrating flood protection into the neighborhood fabric.
 - Battery Park City Resiliency is a set of interrelated resiliency projects being implemented by the Battery Park City Authority. These integrated coastal flood risk management systems aim to protect the Battery Park City area from more severe and frequent storms while integrating into the urban fabric through berms, elevated park areas, passive flood barriers, and deployable barriers where necessary.
 - Living Breakwaters, implemented by New York State Resilient Homes and Construction, is a coastal green infrastructure project along the Tottenville section of the South Shore of Staten Island that provides risk reduction through erosion prevention, wave energy attenuation, and enhancement of ecosystems and social resiliency.
 - Along the shorefront of the Rockaway Peninsula, the U.S. Army Corps of Engineers is constructing a reinforced dune system, new and extended tapered groins to help trap sand and keep it in place, and extensive sand replenishment to protect communities from future storms.
 - In three neighborhoods, Arverne, Edgemere, and Hammels, along the bayside of the Rockaway Peninsula, the U.S. Army Corps of Engineers is in the design phase of a project to protect from high frequency, lower elevation flood events through a system of berms, floodwalls, road ramps, pump stations, revetments, and nature-based features.
- » New York City's Zoning for Coastal Flood Resiliency (ZCFR) seeks to promote resilient buildings throughout the city's current and future floodplains. Based on the New York City Department of City Planning (NYC DCP)'s experience working with communities throughout the floodplain since Hurricane Sandy in 2012, NYC DCP developed a proposal to make zoning more supportive of resilient buildings. ZCFR, approved by the NYC City Council in 2021, makes permanent zoning provisions that were adopted on a temporary basis in 2013 and improves them in several key areas where the rules did not fully support or may have contributed to discouraging resiliency investments in buildings. ZCFR provides flexibility for grading and shoreline design in waterfront

areas to help mitigate flood risk and prohibits the construction of new nursing homes in high-risk areas given the negative health consequences associated with evacuating nursing home residents.

- » New York City's PlaNYC 2023 initiatives to increase resilience to climate change impacts. These initiatives include green roofs, curbside electric vehicle charging and weatherized bike storage, upgraded office space in retrofitted buildings, increased tree canopy, rooftop solar panels, residential electric storage and heat pumps, rain gardens, active greenways, and resilient waterfronts. It also recommends a multilayered strategy for flood resilience and the development of minimum flood resilience standards for shoreline assets.
- » New York City's Panel on Climate Change (NPCC) is an independent advisory body that regularly publishes assessment reports that synthesize several years of scientific research and analysis on climate change and advises City policy-makers on local resiliency and adaptation strategies to protect against rising temperatures, increased flooding, and other hazards. New York City's Panel on Climate Change is exploring a range of policies, social programs, engineering projects, and ecosystem-based solutions. Tools and methods include a focus on extreme heat, recent and long-term observations, projection methods, community engagement, indications, and mapping.
- » Following Hurricane Ida, New York City convened an Extreme Weather Response Task Force. The group explored the City's response to extreme weather events to address a rapidly changing reality in which extreme storms like Hurricane Ida are more common. The Task Force released a report called "The New Normal: Combating Storm-Related Extreme Weather in New York City" which included recommendations and actions to be implemented that address areas such as short-term infrastructure, long-term infrastructure, basement apartments, homeowner and landlord investments, flood insurance and outreach, preparation and emergency planning, and subway flooding.
- » New York City's Climate Resilience Design Guidelines (CRDG) are going beyond the building code and standards, which are informed by historic climate data, by also looking at specific, forward-looking climate data for use in the design of city facilities. Resilient design will be an integral part of the project planning process for city agencies and designers. All new projects and substantial improvements will assess risks to climate hazards in context of the project's purpose, asset type, site location, and funding, and then determine the appropriate resilient design strategies using the Guidelines. Multiple agencies are currently implementing 40 pilot projects using the CRDG.
- » New York City is also proposing new neighborhood-scale stormwater infrastructure systems. A combination of both traditional, or "grey" infrastructure, as well as green infrastructure, will help manage "cloudburst" stormwater runoff, limiting the additional stress placed on the sewer system during heavy rain and coastal storm events. Four neighborhoods have been selected to date.
- » New York City Department of Transportation (NYC DOT) has been working on a broad array of resilience-related projects and policies, including the Raised Shorelines portfolio that is raising the elevation of roadways and bulkheads, and flood-proofing ferry terminals.
- » The New York City Economic Development Corporation (NYC EDC) and the Mayor's Office of Climate Resiliency, now the Mayor's Office of Climate and Environmental Justice, released the Financial District and Seaport Climate Resilience Master Plan, a sweeping framework that aims to shield a

nearly one-mile swath of the Lower Manhattan waterfront from the Battery to the Brooklyn Bridge from rising sea levels and future coastal storms. The Master Plan is estimated to cost between \$5 to \$7 billion, take 15 to 20 years to fully complete, and will ensure that Lower Manhattan withstands rising sea levels as well as increasingly intense coastal storms.

- » NYC EDC is also advancing the Seaport Coastal Resilience project, which is currently in schematic design, on a shorter time horizon and with a smaller geographic focus than the Financial District and Seaport Climate Resilience Master Plan to provide more immediate protection to the neighborhood's most vulnerable areas. Seaport Coastal Resilience plans to raise the elevation at the water's edge to 11 feet above sea level, which will help the area withstand and recover from regular flooding events and provide protection from sea level rise.

U.S. ARMY CORPS OF ENGINEERS

- » New York City has partnered with the U.S. Army Corps of Engineers (USACE) on initiatives like the Rockaways Atlantic Shorefront Resiliency Project to protect shoreline communities most vulnerable to storms and reimagine coastline through efforts like the Lower Manhattan Coastal Resiliency (LMCR) Project, creating a continuous line of protection against rising sea levels and storms.
- » USACE has conducted various coastal storm risk management studies in the New York region, including the following:
 - East Rockaway Inlet to Rockaway Inlet, Queens, and Nassau County
 - Coney Island, Brooklyn
 - Bayside, Queens
 - New York and New Jersey Harbor Tributaries
 - South Shore of Staten Island
 - Spring Creek South, Queens
 - Fire Island Inlet to Montauk, Suffolk County
 - Hashamomuck Cove in Southold, Suffolk County
 - Lake Montauk Harbor, Suffolk County

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PUBLIC AUTHORITIES

- » MTA has undertaken a systemwide \$7.6 billion program, Fix and Fortify, to repair infrastructure damaged during Superstorm Sandy and install coastal storm surge flood protection measures. These include:
 - Entrances protected at underground subway stations, subway tunnel portals outfitted with flood logs, bus depots protected with flood logs, subway yards with perimeter flood protection or external wall hardening, elevating railroad substations above the coastal surge floodplain,

protecting critical railroad signals and communications equipment, and massive marine doors for the Hugh L. Carey and Queens Midtown Tunnels.

- » The MTA has also undertaken measures to make the subway system more resilient to flooding during torrential rainfall events, including installing passive stormwater mitigations, such as raised subway entrance steps and raised street vents. MTA's design standards have evolved to adapt to new challenges the transportation system faces such as the MTA's Design Flood Elevation standards for coastal storm surge that defines the minimum elevation to which a building or asset should be elevated or floodproofed, within a flood hazard area.
- » In April 2024, the MTA released a Climate Resilience Roadmap that includes a multi-hazard Climate Vulnerability Assessment to understand the magnitude and timing of extreme weather impacts on MTA infrastructure, 10 goals with a series of short- and long-term actions to boost resilience across the MTA's system, and a multi-pronged implementation framework.
- » MTA also engages in emergency preparedness for extreme weather, including coastal surge, torrential rainfall, extreme heat, and winter weather. Even before an extreme weather event occurs, the MTA begins intensive internal coordination and proactive meteorological tracking. Additional coordination protocols are deployed when severe weather approaches, including activation of the MTA's central incident command center.
- » PANYNJ has developed guidance that uses an asset-specific approach that considers the life expectancy of each asset and the risk of agency-specific events happening during that life span. PANYNJ also examines the need for improving reliability when undertaking major repairs and reconstruction and has documented significant cost savings.
- » Several key resilience and flood abatement projects that have been implemented in some of the hardest-hit PANYNJ facilities include:
 - At the World Trade Center, a \$150 million program features a three-tier flood protection system, starting with a deployable flood wall around the perimeter. A second ring provides at-grade protections at all entrances and vent shafts, with sub-grade protections for critical equipment, coupled with a high-capacity pumping system.
 - LaGuardia Airport's new Pump Station 6 substation powers one of six high-capacity airfield pumps, together capable of evacuating more than 400,000 gallons of water per minute. The substation was rebuilt on 10-foot stilts to reduce susceptibility to flooding.
 - Hoboken Port Authority Trans-Hudson (PATH) resilience projects include constructing a water-tight, stainless steel and aquarium glass headhouse, with deployable flood planks designed to secure entrances before storms. Heavy steel flood doors have been installed to seal off the station from street-level flooding.

LOCAL COMMUNITIES

- » Suburban counties in NYMTC's planning area have updated hazard mitigation plans with resilience measures and evacuation plans through county offices of emergency management. Through

county planning commissions, counties have also worked with local municipalities on coordinated resilience planning and zoning changes and have also pursued revisions and updates of the resilience elements of county comprehensive plans.

- » All suburban counties, as well as a variety of their local municipalities, participate in New York State's Climate Smart Communities program. Nassau and Suffolk counties have engaged with the Governor's Office of Storm Recovery on disaster recovery and placemaking.
- » Both Nassau and Suffolk counties have participated in the HUD Rebuild by Design and New York Rising Communities programs. Westchester County has participated in stormwater management and flood mitigation for the Bronx River flood plain. Rockland County has participated with Hudson Riverfront Communities on resilience issues. Putnam County has participated in storm water management through its Soil and Water Conservation District and Department of Public Works.
- » Communities at risk of flood peril have the regulatory authority to address local land use, zoning, and building codes to avoid development in floodplains. Communities participating in the National Flood Insurance Program must incorporate flood-resistant construction standards into building codes. Local ordinances have been established in some municipalities to reduce impervious surfaces such as driveways and parking areas, promote uniform bulkhead elevations, and require relevant buildings standards.

EXTREME WEATHER AND SEA LEVEL RISE RISK ANALYSIS

- » The Multi-State Resilience Working Group has compiled a list of data topics and sources to support resilience work being done by the MAP Forum's members MPOs and COGs to share data resources on resilience.
- » The PANYNJ's Flood Product Library assists design teams, line departments, and facilities to quickly identify potential flood resilience solutions with information for nearly 200 flood control devices, searchable by over a dozen key attributes and characteristics.
- » PANYNJ's systemwide Climate Risk Assessment is an ongoing program to assess the full portfolio of assets to identify residual and emerging flood vulnerabilities to strategically mitigate highest priority risks. Phase 1, a preliminary scan of flood-related risks across all PA facilities, was completed in 2020. Phase 2, a multi-year program initiated in 2021, entails the application of rigorous, engineering-based assessment techniques on a facility-by-facility basis.
- » MTA completed a multi-hazard Climate Vulnerability Assessment included in the April 2024 Climate Resilience Roadmap, to understand the magnitude and timing of extreme weather impacts on MTA infrastructure.
- » NYSDOT is in the process of updating its' internal vulnerability assessment process. NYSDOT also tracks and maps repetitively repaired/damaged assets from declared emergency events, as required under FHWA's Transportation Asset Management Program rule.

COORDINATION ACROSS JURISDICTIONS

- » As discussed earlier, the MAP Forum maintains a Multi-State Resilience Working Group which builds on the FHWA's Post-Sandy Study to expand the MAP Forum's resiliency work to include vehicle electrification, pollution mitigation, and transportation impacts from health-related events. Participants include representatives of the constituent MPOs and councils of Government.
- » PANYNJ collaborates with regional and national science, Government, and industry partners to develop innovative solutions to our most pressing resilience challenges. In addition, the agency develops resources to facilitate smart, resilient decision-making.

ENERGY INFRASTRUCTURE AND TRANSPORTATION

- » NYS has committed to installing 3000 MW of energy storage by 2030 to provide flexibility and streamline the delivery of intermittent renewable resources. Investment in electricity transmission and distribution systems will increase grid flexibility and resilience.
- » Clean Path NY is an innovative investment in clean energy infrastructure to deliver reliable clean power to New York communities that currently rely on fossil fuel power generation. Comprised of over 20 renewable energy generation projects and an approximate 175-mile underground in-state transmission line, the project will generate 3,800 MW of new wind and solar power and deliver almost 8 million megawatt-hours of pollution-free energy.
- » The Town of Brookhaven will construct a 1.9 MW battery storage facility in Patchogue.

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HUMAN AND PUBLIC HEALTH STRESSORS

- » U.S. DOT has several research programs dedicated to ensuring a secure, connected transportation environment. The Transportation Security Administration (TSA) developed a cybersecurity toolkit with cyber risk information guiding surface transportation operators with under 1,000 employees.
- » Other cybersecurity developments at the Federal level include the following:
 - On May 15, 2019, the White House issued a new national security executive order focused on information and communications technology and the services supply chain, which impacts all modes within the transportation sector.
 - The U.S. Department of Homeland Security's (DHS) new National Critical Functions list highlights those functions in the United States most at risk for a cybersecurity attack and includes every mode of transportation.
 - TSA's Cybersecurity Roadmap makes clear that it has the statutory authority to regulate the transportation sector for cybersecurity.
- » Countering potential threats has required innovative and extraordinary levels of coordination between transportation providers, emergency preparedness and response organizations, and law enforcement and intelligence at all levels. The January 2019 release of New York State's Counterterrorism Advisory Panel report underscores these needs for the transportation sector.

- » During emergency situations, U.S. DOT provides information related to transportation permits, waivers, and other regulations and authorities that are applicable to public mobility and emergency response. U.S. DOT modal administrations also have defined roles.
- » The FTA provides guidance for transit operators and administers emergency funding appropriated by Congress.
- » Similarly, FHWA oversees emergency funding, serves as a clearinghouse for road closure information, and administers emergency permits.
- » At the state level, the New York State Department of Health (NYSDOH) oversees community preparedness for public health emergencies in cooperation with local health departments.
- » NYSDOH's Office of Health Emergency Preparedness is responsible for the coordination and management of all activities for public health and healthcare facility preparedness. These activities include preparedness planning and making sure that emergency plans work in drills, exercises, and real life. NYSDOH also tracks the incidence of infectious disease.
- » Each of NYMTC's local member agencies' jurisdictions—New York City, Long Island, and the lower Hudson Valley—work closely with NYSDOH in preparing for, addressing, and recovering from public health emergencies.

4.4.4 *PLANNED IMPROVEMENTS AND RECENTLY LAUNCHED PLANNING ACTIVITIES*

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Beyond the existing initiatives described above, which are either completed or ongoing, several resilience improvements and planning activities have launched recently or are planned for initiation.

LONG ISLAND

- » The Long Island Regional Planning Council (LIRPC) has partnered with LiRo GIS Services to create a comprehensive database to quantify the economic flood risk threatening Long Island communities in terms of estimated number of businesses, employees, and sales volume.
- » The South Shore Sea Gate Study proposes a layered defense system to protect low-lying coastal communities from conditions like unprecedented flooding experienced during Superstorm Sandy. The study has been funded through a NYSDEC grant. The preferred option calls for the installation of sea gates, which would be activated only before major storms, at the East Rockaway, Jones, Fire Island, Moriches, and Shinnecock inlets. The plan also calls for the installation of “cross bay baffles”—dividers with lifting panels used to direct and slow the flow of water—near the Meadowbrook and Robert Moses parkways, as well as in Amityville, Bayport, and Smith Point.

SUFFOLK COUNTY

- » Suffolk County's nature-based resilience study will be looking at road elevation, hardening infrastructure, offshore reefs, coastal retreat, and beach replenishment. Project goals are to create

site-specific recommendations, a handbook to guide evaluations, and a capital financing plan. Assets will be categorized for risk assessments and implementable concepts and solutions for up to ten priority assets. The study will also conduct three benefit-cost analyses to assess wave attenuation benefits over the wetlands, with a focus on reducing costs behind wetland sites.

- » The Suffolk County Department of Economic Development and Planning and a Project Advisory Committee (PAC) made up of elected officials, County staff, environmentalists, and other key stakeholders will identify resiliency enhancements. VAn interactive, a web-based geodatabase tool will illustrate County-owned properties most at risk from sea level rise or flooding. The Suffolk County Coastal Resilience Initiative will install sewers in communities that are in unsewered, low-lying areas along the County's south shore that had been inundated by Superstorm Sandy. The sewer projects mark the largest investment in water quality infrastructure in the County in more than 40 years and will eliminate over 7,000 cesspools and septic systems.
- » A task force on coastal resiliency will identify how frequent flooding, heavy rains and storm surge would impact homes, roads and storm water infrastructure and will recommend related resilience projects. Various local municipal waterfront revitalization plans will also address coastal resiliency.
- » To encourage growth in appropriate locations, mitigate single-occupancy vehicle use and make efficient use of existing infrastructure, various municipalities have undertaken rezonings, overlays, or other strategies to re-focus growth to existing downtowns and rail corridors.

NASSAU COUNTY

- » USACE released a draft report for the Nassau County Back Bays Coastal Storm Risk Management Study. The report outlines a "Tentatively Selected Plan" framework, which includes the elevation of more than 14,000 residential structures and dry flood proofing of more than 2,500 industrial/commercial properties to reduce the risk of flood damages associated with storm surge. The potential measures under consideration from the studies are flood walls, storm surge barriers, bulkheads, non-structural measures, and natural and nature-based features.
- » The Nassau County Planning Commission has coordinated local municipal zoning changes and undertaken multi-municipal drainage and watershed studies.
- » An update of Nassau County's hazard mitigation plan has incorporated various resilience measures.

NEW YORK CITY

- » Local Law 2021/122 requires the Mayor's Office of Long-Term Planning and Sustainability, or their designee, in consultation with other City agencies, to develop and post on its website a climate adaptation plan that considers and evaluates various extreme weather hazards impacting the city and its shoreline. AdaptNYC is New York City's long term adaptation plan.
- » USACE has laid out a plan to protect a New York Harbor from flooding, under which 900 miles of coastal area will be protected by installing nine storm surge gates in Jamaica Bay, Coney Island Creek, Newtown Creek, the Gowanus Canal, Sheepshead Bay, Gerritsen Creek, Flushing Creek, and between New Jersey and Staten Island.

- » USACE proposed a \$52.6 billion plan to install sea walls, breakwaters, levees and flood walls around New York City's harbor and its tributaries. USACE supported an option featuring 12 storm surge gates that would close during storms. They would be in Jamaica Bay, Coney Island Creek, Newtown Creek, the Gowanus Canal, Sheepshead Bay, Gerritsen Creek, Flushing Creek, and between New Jersey and Staten Island.
- » The USACE plan incorporates smaller solutions as well. Measures on land include floodwalls, levees, elevated promenades and raised roads to boost coastal protection, as well as nature-based solutions such as wetland restoration and "living shorelines," which use plants and organic materials to manage erosion and buffer a coast.
- » The Build It Back program is funded by \$2.2 billion in Federal Community Development Block Grant Disaster Recovery (CDBG-DR) and overseen by Mayor's office of Housing Recovery Office in coordination with the New York City Department of Housing Preservation and Development (HPD) and the New York City Department of Design and Construction (DDC) to support recovery from Superstorm Sandy. The program assists applicants through either a reimbursement check, construction services, or acquisition of their home. FloodHELPNY is funded through the New York Governor's Office of Storm Recovery and New York Rising, as well as FEMA through the Mayor's office of Climate and Environmental Justice/Housing Preservation Development. FloodHELPNY.org is a platform for engaging and informing New York City homeowners about protecting their homes and finances from flooding that is expected to worsen with rising sea levels.
- » Flood Net seeks to understand the frequency, severity, and impacts of flooding in New York City, offering residents data and knowledge by bringing together innovative sources of information on street flooding impacts in neighborhoods that are vulnerable to high tides, storm surge, and stormwater runoff. Researchers, city agencies, and others use this information to reduce flood risk.

MANHATTAN

- » The South Battery Park City (BPC) Resiliency Project explores creating a continuous flood barrier from the Museum of Jewish Heritage, through Wagner Park, across Pier A Plaza, and along the northern border of Historic Battery Park, to a designated elevation point just west of State Street. The Combined North and West BPC Resiliency Project will span BPC's North Esplanade and entail a deployable barrier crossing of West Street/Route 9A as one of BPC's (and Lower Manhattan's) most vulnerable points for storm surge inundation and flooding. The West BPC perimeter project area will encompass a new line of flood protection to be woven into the neighborhood along or adjacent to the waterfront at the western edge of BPC.

STATEN ISLAND

- » Through HUD's Rebuild by Design program, the Staten Island Living Breakwaters Project was selected which proposed a layered resiliency approach to promote risk reduction through erosion prevention, wave energy attenuation, and enhancing ecosystems and social resiliency. The project is in close partnership with NYSDEC and City of New York, and state funding will help implement the project along the Tottenville section of the South Shore of Staten Island. The South Shore of Staten

Island Coastal Storm Risk Management Project area is located along the south shore of Staten Island from Fort Wadsworth to Oakwood Beach.

LOWER HUDSON VALLEY

- » Putnam County developed a countywide Hazard Mitigation Plan in 2021 through funding from FEMA. The Plan includes resilience-related strategies and policies, including evacuation planning.
- » Rockland County is undertaking a study to develop a Continuity of Operations Plan for county Government, as well as a county comprehensive plan update which will include countywide resilience strategies. There are four flood mitigation and resilience report studies available for Rockland County: Hackensack River, Mahwah River, Minisceongo Creek, and Sparkill Creek. These analyses were conducted as part of the Resilient New York Program, an NYSDEC initiative. The county's 2024 Hazard Mitigation plan has been developed and is currently in public review.
- » Westchester County is also updating their comprehensive plan which will include both resilience and sustainability components as well as the use of natural infrastructure in flood plains.

4.4.5 RECOMMENDED STRATEGIES AND ACTIONS

PLANNING AND RESEARCH INITIATIVES

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- » Identify the vulnerable transportation assets throughout the NYMTC planning area.
- » Benchmarking research on protection/fortification techniques and methodologies.
- » Update previously performed extreme weather risk analyses.
- » Perform a redundancy assessment for the transportation system.
- » Evaluate vulnerable transportation assets in Communities of Concern.
- » Perform an energy vulnerability assessment for the transportation system.
- » Perform an assessment of public health impacts and relevant resilience strategies.

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Fully develop the MAP Forum resilience data portal.
- » Update sea level rise and inundation data from the Post-Sandy Study.
- » Assess available data sources and predictive tools.
- » Assess transportation systems to identify primary redundancy needs.

PLANNING PROCESS RECOMMENDATIONS

- » Convene a NYMTC Resiliency Working Group.
- » Pursue multi-state coordination through the Multi-State Resilience Working Group.

- » Develop an ongoing risk analysis report for the NYMTC planning area.
- » Plan appropriate public workshops and municipal meetings through the NYMTC Resiliency Working Group and Multi-State Resilience Working Group.
- » Through the Multi-State Resilience Working Group, consider key vulnerable transit interfaces in the multi-state region.
- » Address redundancy improvements through the NYMTC Resiliency Working Group and the Multi-State Resilience Working Group.
- » Engage impacted Communities of Concern through the Thriving Communities Network.
- » Develop various types of energy investment strategies for transportation.

PROGRAM RECOMMENDATIONS

- » Integrate resilience considerations into the project evaluation/selection process.
- » Program redundancy improvements as appropriate.

4.4.6 PERFORMANCE MEASURES

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirement.

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

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The performance measures listed below will assist in measuring progress toward this vision goal and its objectives, and in informing investment decisions:

- » Number of lane miles of Federal-aid roadways in the designated vulnerable transportation system and percent hardened to resist flooding events.
- » Number of Federal-aid bridges/culverts in the designated vulnerable transportation system and percent hardened.
- » Number of miles of trailways/bikeways/ greenways in the designated vulnerable transportation system and percent hardened.
- » Number of miles of grade separated bus facilities in the designated vulnerable transportation system and percent hardened.
- » Number of transit and freight track miles in the designated vulnerable transportation system and percent hardened.
- » Number of transit terminals/transfer stations in the designated vulnerable transportation system and percent hardened.

- » Number of rapid transit/commuter rail stations in the designated vulnerable transportation system and percent hardened.
- » Number of transit yards/facilities in the designated vulnerable transportation system and percent hardened square footage of port/intermodal facilities in the designated vulnerable transportation system and percent hardened.

4.5 VISION GOAL—CONGESTION

We seek to establish and maintain a transportation system for which congestion is mitigated through investments and technology in support of healthier communities, more seamless travel, improved quality of life, and regional economic competitiveness.

4.5.1 DESCRIPTION

Chapter 3 and Appendix B of *Moving Forward 2055* describe forecasted growth in population, employment, and the amount of goods moving into, within and through NYMTC's planning area. This goal seeks to enhance the efficiency of the transportation system by identifying and funding to the extent possible, feasible and cost-effective investments in programs, projects and services that will mitigate transportation congestion. Additionally, greater efficiency and measurable reduction in travel time can be achieved through the implementation of requisite TSMO strategies. The application of NYMTC's Congestion Management Process (CMP) will also be important in seeking a transportation system that efficiently serves the projected growth of people and goods. More detail on the region's multimodal transportation system and congestion on key roadways is available for viewing in the [Moving Forward 2055 Interactive Map](#).

4.5.2 OBJECTIVES

- » Sustainably manage current or future demands, with an emphasis on expanding active transportation, and transit.
- » Support mobility for all users by encouraging active transportation, micromobility, complete streets, and other strategies.
- » Modernize local freight networks to efficiently plan for growth in the volume of and change in product deliveries.
- » Expand the reach of the system to emerging markets, addressing access to and incentivizing employment, social and recreational opportunities.

- » Incorporate emerging and innovative technologies, transportation services and tools into efficient network design, operations, and monitoring.
- » Coordinate with governing bodies for clearer accountability, funding, and planning arrangements.

4.5.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

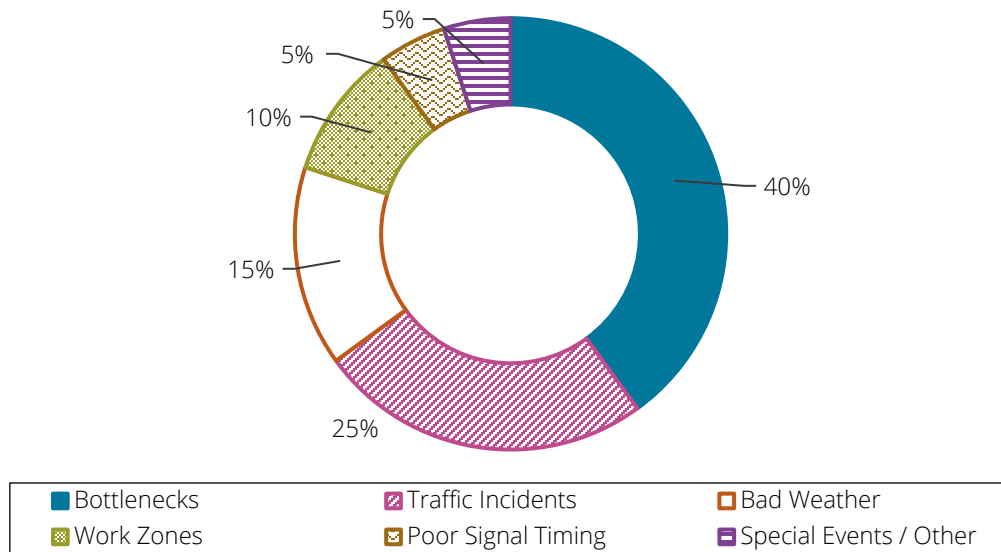
TYPES OF TRAFFIC CONGESTION

FHWA categorizes the causes of traffic congestion as follows:

- » **Physical Bottlenecks**—Where demand exceeds capacity due to geometry along roadways or at intersections, interchanges, transit facilities, etc.
- » **Traffic Incidents**—Nonrecurring event that causes a reduction of roadway capacity or an abnormal increase in demand (e.g., crashes, disabled vehicles).
- » **Weather**—Events such as snowstorms or flooding due to rainfall.
- » **Work Zones**—Construction activities on the roadway that temporarily reduce capacity, including lane reductions, lane shifts, and detours.
- » **Special Events**—Events that create a surge in traffic beyond normal traffic patterns such as sporting events, concerts, street festivals, and visiting dignitaries.
- » **Traffic Demand and Flow Fluctuations**—Day-to-day variability in traffic and peaking of demand that can be as much as 15 to 20 percent on an individual roadway depending on the day of the week.
- » **Traffic Operations**—Disruption of traffic flow due to non-optimized or non-integrated signals and/or insufficient intersection capacity.

The national averages in Figure 4.18 provide insights regarding the sources of traffic congestion in the context of these categories. Bottlenecks (40 percent) are the greatest source of congestion, followed by traffic incidents, which account for 25 percent of congestion.

Figure 4.18 National Distribution of Sources of Congestion



Source: The Sources of National Congestion Summary, FHWA.

Several specific factors and characteristics contribute to traffic congestion in the NYMTC planning area, including the following:

- » Size and Scale—The patterns of land development and size of the population have resulted in peak vehicular demand outstripping transportation capacity in many locations.
- » Topography—NYMTC's planning area includes three large islands (Staten Island, Manhattan Island, and Long Island) that, along with the Hudson River and Long Island Sound, create the need for numerous water crossings for roadways, rail lines, and waterborne services. Limitations to the capacity at these crossing facilities are a major cause for congestion. Additionally, north-south oriented ridges and smaller rivers in the Hudson Valley and east-west oriented glacial moraines on Long Island have influenced the location of transportation infrastructure and resulted in more limited east-west (in the Hudson Valley) and north-south (on Long Island) transportation capacity.
- » Major transportation hubs, regional and international airports in and around the NYMTC planning area, as well as major rail and bus stations and transfer locations, and port facilities. Many of these locations are significant interconnections between transportation modes and services.
- » Large event venues, such as stadiums, arenas, and convention centers that generate considerable vehicle, transit, and foot traffic.
- » Tourist and recreational attractions, generating considerable travel from residents and visitors.
- » Major movement of goods, particularly by truck, driven by the planning area's and multi-state region's large population and level of economic activity, which results in goods moving into, out of, within, and through NYMTC's planning area. Additionally, an underutilization of existing waterways for goods movement within the planning area.
- » Lack of direct transit connections between and within outer boroughs and suburban counties incentivizes travel by personal vehicle.

URBAN AREA COMPARISONS

As defined by the U.S. Census Bureau, the New York-Jersey City-Newark Urban Area (UA) is the largest in the country by population, with more than 7 million more residents than the next largest Los Angeles-Long Beach-Anaheim UA. Among peer UAs, New York-Jersey City-Newark has the lowest daily VMT per capita but a higher-than-average travel time index (TTI), which is the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. The lower VMT per capita is likely due to the greater availability and use of public transportation throughout the UA and the dense urban form of portions of the UA. Comparison data are presented in Table 4.3.

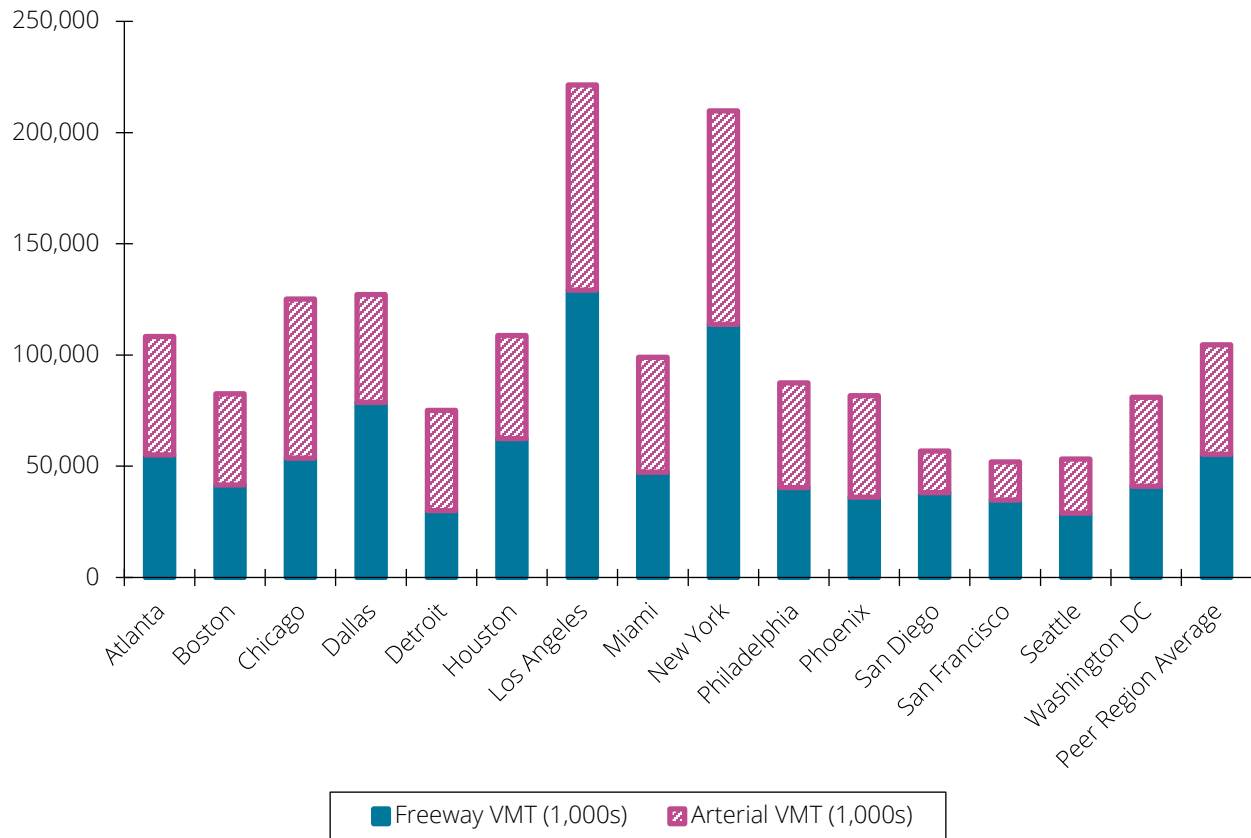
Table 4.3 Urbanized Area Comparisons

Metropolitan Area	Population(million)	Daily VMT per Capita (Freeway + Arterial)	Travel Time Index
Boston	4.57	18.09	1.22
New York City	19.20	10.92	1.32
Philadelphia	5.62	15.56	1.23
Washington D.C.	5.07	15.99	1.25
Atlanta	5.20	20.62	1.25
Miami	6.09	16.25	1.34
Detroit	3.78	19.86	1.20
Chicago	8.69	14.39	1.30
Houston	5.60	19.42	1.27
Dallas	5.93	21.45	1.23
Phoenix	4.18	19.56	1.22
San Diego	3.19	17.80	1.29
Los Angeles	12.45	17.79	1.50
San Francisco	3.53	14.72	1.48
Seattle	3.55	15.01	1.32
Peer Region Average	6.45	17.16	1.29

Source: Texas A&M Transportation Institute, 2023 Urban Mobility Scorecard.

In terms of overall travel, only the Los Angeles-Long Beach-Anaheim UA exceeds the volume of travel experienced in the New York-Newark-Jersey City NY-NJ UA, as measured in VMT. See Figure 4.19.

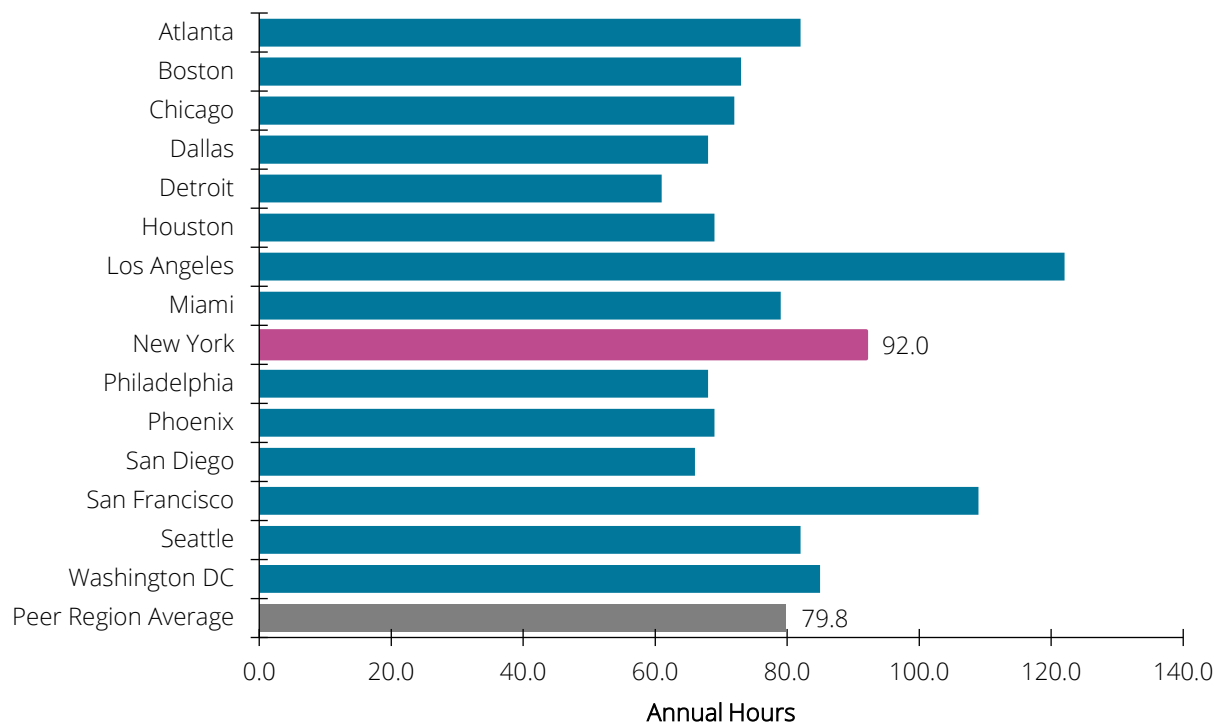
Figure 4.19 Average Daily VMT Comparison



Source: Texas A&M Transportation Institute, 2023 Urban Mobility Scorecard

On a per commuter basis, the New York-Jersey City-Newark UA experiences the third highest level of annual travel time delay per year (roughly 90 hours) with only the Los Angeles and San Francisco UAs exceeding these levels (Figure 4.20).

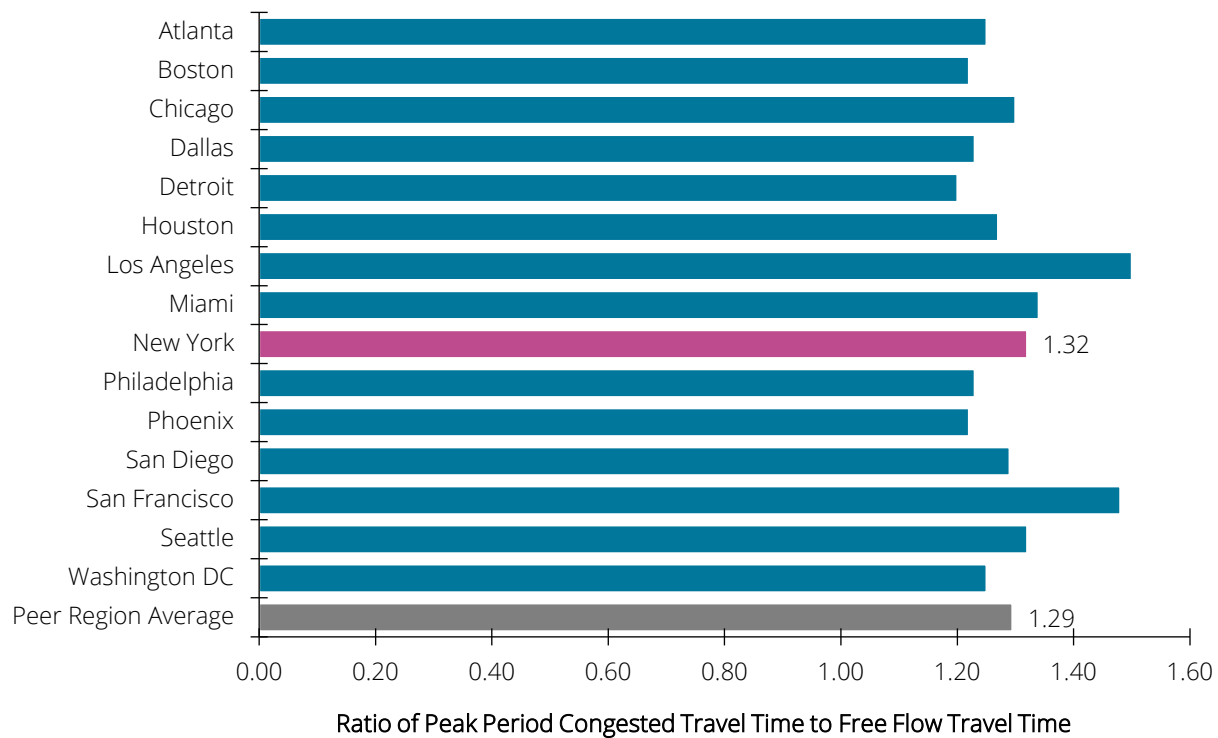
TTI comparisons are shown in Figure 4.21. TTI is the ratio of travel time in the peak period to travel time at free-flow conditions. A TTI of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak period. TTI for the New York UA is slightly higher than the average for peer UAs and well below TTIs for the two most congested UAs, Los Angeles (1.50) and San Francisco (1.48).

Figure 4.20 Annual Hours of Delay Per Commuter

Source: Texas A&M Transportation Institute, 2023 Urban Mobility Scorecard

Figure 4.21 Travel Time Index

4-55



Source: Texas A&M Transportation Institute, 2023 Urban Mobility Scorecard.

CHANGING TRAVEL PATTERNS

As described in Chapter 3 of *Moving Forward 2055*, peak travel periods have been changing, even before the COVID-19 pandemic, and this change has accelerated and grown post-pandemic. Nationally, the weekday morning peak travel period (6:00 AM-10:00 AM) volumes are down about 12 percent in 2023 compared to 2019. The weekday afternoon/evening peak (3:00 PM-6:00 PM) is down just 9 percent in 2023 compared to 2019. However, average hourly traffic during the weekday midday is up 23 percent, and per hour nearly the same number of trips start during the midday as the evening commute period, typically the most congested period of the day.¹⁰

Some factors contributing to travel trends include workforce changes due to increased telework and flexible hours, resulting in more combined trips throughout the day as individuals make trips for multiple purposes. There has also been a pronounced shift to e-commerce resulting in deliveries of goods “to the door.” Since the pandemic, an increase in telecommuting, which began during the pandemic lockdown periods, has “flattened the peaks” of both road congestion and transit ridership, while off-peak and weekend traffic and transit ridership has increased beyond pre-COVID levels. Telecommuting has been the largest contributor to these changes, but single occupant vehicle use is higher than pre-pandemic levels.¹¹

CHANGING DEMAND

VMT and VHT are expected to increase by 11.9 percent and 14.4 percent, respectively, through the Plan horizon year across NYMTC’s planning area. As described in Chapter 3, the population is expected to grow by 13 percent during this same period, to 14,327,000. Total labor force and employed labor force are expected to grow by 11.4 percent and 12.7 percent, respectively. Population and employment growth, with commensurate changes in economic activity and travel will significantly impact transportation demand.

TRUCK DEPENDENCE

As described in the Regional Freight Plan Element of *Moving Forward 2055* (see Appendix D), NYMTC is at the center of a large, complex, and multi-state metropolitan cluster that generates goods moving into, out of, through and within the planning area. Moving goods by truck is the predominant freight mode in NYMTC’s planning area, accounting for 94 percent of all tonnage moved by volume. All freight modes are expected to show growth in both tonnage and value through 2055, except for waterborne. However, it should be noted that New York City is actively working to increase waterborne cargo.

EXISTING INITIATIVES

Several initiatives have been undertaken in and around the NYMTC planning area to address pervasive and growing traffic and transit congestion, including the following:

CONGESTION MANAGEMENT PROCESS (CMP)

[23 CFR 450.322](#)(a) states the following:

The transportation planning process in a Transportation Management Area (TMA) shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53 through the use of travel demand reduction (including intercity bus operators, employer-based commuting programs such as a carpool program, vanpool program, transit benefit program, parking cash-out program, shuttle program, or telework program), job access projects, and operational management strategies.

Per this regulatory requirement, NYMTC's CMP recognizes congestion can and should be eased by increasing capacity to move more people and freight across the multimodal transportation system, while managing future demand for vehicular travel. Congestion can be mitigated by implementing supportive policies and strategies such as those described in the CMP toolbox, including improving traffic management; more efficient use of existing highway system capacity; and implementing various transit strategies as well as alternatives to driving alone. NYMTC's CMP monitors and evaluates congestion mitigation strategies and related projects across the metropolitan transportation planning process through publishing a CMP Status Report which accompanies each newly adopted Regional Transportation Plan.

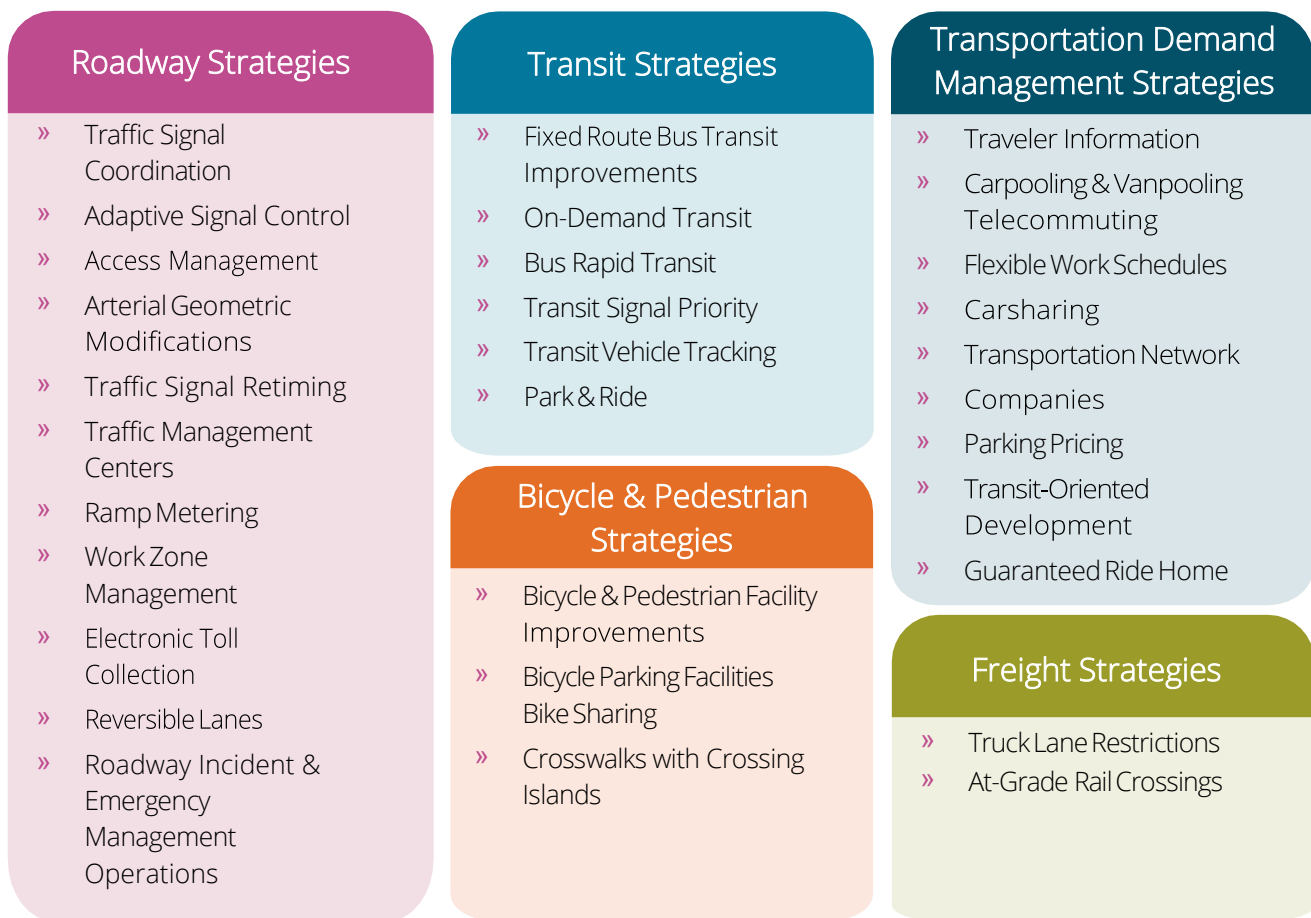
TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS (TSMO)

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TSMO strategies, programs, and improvements are a major component of NYMTC's CMP leading to safer roads, reduced vehicular travel demand, less traffic congestion, and higher transit utilization. TSMO refers to integrated strategies to optimize the performance of transportation infrastructure through projects and programs designed to operationally maximize capacity and improve the safety and reliability of the transportation system.

TSMO measures improve transportation system efficiency to move more people and goods and offer high returns on lower cost operational and demand management projects and programs. Additionally, strategies can help reduce transportation sector pollution by maximizing system efficiency. TSMO also seeks to improve the safety, security, and resiliency of the transportation system, and to optimize travel times and costs for all travelers. The full range of TSMO strategies and actions are shown in Figure 4.22.

Figure 4.22 TSMO Strategies and Actions



Source: NYMTC.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

Coordinated regional and subarea Transportation Demand Management (TDM) programs which provide travelers with a more integrated, convenient, and accessible transportation network. TDM programs in the NYMTC planning area are built around 511NY, which provides transportation information and programmatic alternatives to driving alone. Under the umbrella of 511NY, outreach is undertaken to employers, commuters, and members of the public with information on carpooling, vanpooling, workplace commuter benefits, public transportation, guaranteed ride home, bicycling, walking, and teleworking.

Active Transportation and Demand Management (ATDM) and Integrated Corridor Management (ICM)¹² are two TSMO approaches that attempt to manage demand in specific areas and corridors through use of information and operational integration that encourage those in these areas and corridors to use alternative routes or services based on existing conditions. Examples in the NYMTC planning area include I-287 in Rockland and Westchester counties and the I-495 ICM project in Manhattan and Queens.

SHARED MOBILITY

Shared mobility programs, which include services such as bikeshare, car-share and other micromobility conveyances; and ride hailing services through transportation network companies. Bikeshare programs started in New York City in May 2013 with the CitiBike program. Similar programs also exist in suburban counties and are expected to grow in the future. These programs have been expanding to include e-bikes and other micromobility conveyances.

Micromobility is defined as any small, low-speed, human or electric-powered transportation device. Micromobility includes bicycles, scooters, electric bicycles (e-bikes), electric scooters (e-scooters), and other small, lightweight, wheeled conveyances. Micromobility includes privately owned and shared-use station-based or dockless fleets (bikeshare and scooter-share).¹³

CORDON PRICING

Cordon pricing introduces a surcharge for entering a certain geographical area, usually the dense core of a city. Tolls can be flat-fee or variable based on time of day, vehicle type, and other parameters. Cordon pricing has been implemented across many global cities including London, Stockholm, and Milan, lowering congestion and pollution, while raising transit travel speeds and a significant amount of revenue.

MANHATTAN CENTRAL BUSINESS DISTRICT (CBD) TOLLING

Manhattan CBD Tolling was initiated on January 5, 2025. Under this program, vehicles are charged a toll to enter the Congestion Relief Zone in Manhattan south of and including 60th Street but excluding peripheral limited access roadways. Tolls are levied based on vehicle type, time of day, with discounts or exemptions available under certain conditions. Manhattan CBD Tolling is the first such program initiated in the United States to manage congestion and raise revenue for transit services.

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TRANSIT IMPROVEMENTS AND INNOVATIONS

Recent and planned transit improvements and innovations are designed to help provide alternatives to vehicular travel, reduce congestion, and improve the efficiency of the transportation system.

MICROTRANSIT SERVICES

Microtransit is an on-demand publicly available service using app-enabled trip request and fare payment functions. Microtransit is generally used as a complement to fixed route service, providing transportation during time periods or in geographic regions poorly served by regular fixed route service. While microtransit is more expensive to operate than fixed route transit and often charges a premium fare, flexibility provides a good customer experience in hard-to-serve areas.¹⁴

Microtransit services are currently planned or operating in NYMTC's planning area. Both Suffolk Transit in Suffolk County and Nassau Inter-County Express (NICE) Bus in Nassau County currently offer microtransit

services. Additionally, Putnam County's microtransit service (Putnam On-Demand) launched in May 2025 and Westchester County's Mobility and Transit Plan identifies several proposed microtransit zones in the county.

BUS PRIORITY MEASURES

Continued expansion and implementation of bus priority measures in NYMTC's planning area, including busways, transit and truck priority streets, offboard fare payment, and bus rapid transit (BRT) aim to increase transit service speeds and reliability. These measures include transit signal priority (TSP) to enable buses to travel faster by adjusting traffic signals along their route in real time to minimize delays.

FARE COLLECTION

MTA has introduced One Metro New York (OMNY) a new *tap- and -pay* fare collection system. OMNY accepts contactless bank cards (credit or debit) or smart devices to pay transit fares along with a dedicated OMNY stored value card. OMNY will be gradually expanded to three MetroCard Affiliate bus systems in the NYMTC planning area: Westchester County Department of Transportation Bee Line System; NICE Bus System, and Hudson Rail Link. PANYNJ introduced a similar contactless payment system called TAPP for PATH service from New Jersey to/from Manhattan.

TRANSIT SERVICE COORDINATION NEEDS ASSESSMENT

Per the recommendations of previous planning cycles, this needs assessment of transit service coordination across jurisdictional lines is evaluating service integration needs. The assessment's relevant objective is to improve the integration of the multimodal transit network in NYMTC's planning area. The assessment is evaluating intermodal connections in identified priority service needs areas, including, but not limited to, consideration of information, service, fare policies and passenger facilities. Recommendations will be considered by NYMTC's Transportation Coordinating Committees.

FREIGHT INITIATIVES

Several programs are underway to reduce truck dependence in the planning area. Delivering New York is New York City's strategic freight management plan, offering a comprehensive policy framework for a safe, sustainable, fair, and efficient last-mile freight delivery system. The plan emphasizes the importance of transforming the "last mile"—the final stage of delivery.⁶ Among the plan's recommended programs are:

- » **Commercial Cargo Bicyclist Pilot Program**—This pilot program encourages the use of cargo bicycles for commercial purposes in New York City and is open to any business interested in utilizing cargo bicycles for last-mile freight delivery.⁷
- » **Blue Highways Program**—This program seeks to encourage the use of waterways to move goods into and around New York City.⁸
- » **Off-Hour Deliveries (OHD) Program**—This program encourages goods delivery during the off-peak hours (7:00 p.m. to 6:00 a.m.) to decrease congestion and truck pollution. It is customized to help develop the most efficient delivery method for each business.⁹

Various projects are also in active development to improve the rail freight system in the NYMTC planning area. These include advancing the Cross Harbor Freight Program Tier II Environmental Impact Statement; addressing grade crossing issues and needs; and protecting the rail freight capacity of the Bay Ridge Line in conjunction with improvement at the 65th Street Yard in Brooklyn.

4.5.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contain the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Assess the impact of micromobility conveyances on existing bicycle lanes and greenways from an efficiency perspective.
- » Identify new mobility technologies and concepts within micromobility, Mobility-as-a-Service (MaaS), complete streets.
- » Assess the enhancement of 511NY to a complete MaaS platform.
- » Prioritize grade crossing needs in the suburban subareas of the NYMTC planning area.
- » Explore connected vehicle technologies and determine feasibility of deployment in congested corridors and areas.
- » Evaluate employer-based alternative transportation incentive programs.
- » Monitor critical freight corridors throughout the planning area.
- » Assess integration of fare/toll payment for all modes of transportation.

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DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Monitor the effectiveness of CBT tolling in mitigating traffic congestion over time.
- » Expand the Regional Freight Data portal.
- » Monitor designated critical freight corridors and bottlenecks.
- » Expand the data program to include microtransit and micromobility.

PLANNING PROCESS RECOMMENDATIONS

- » Develop guidance on Complete Streets implementation and curb management.
- » Continue use of the CMP Status Report to inform planning through the TSMO working Group.
- » Review Intelligent Transportation Systems (ITS) architectures through the TSMO Working Group.
- » Advance programs and initiatives for the multistate region through the Metropolitan Mobility Network.

PROGRAM RECOMMENDATIONS

- » Initiate micromobility pilots in suburban communities and/or activity centers.
- » Expand off-hours delivery program within and outside of New York City to minimize conflict with high volume hours for passenger vehicle traffic and ped/bike traffic.
- » Implement the recommendations of the Transit Service Coordination Needs Assessment.
- » Seek funding to support Transit Oriented Development, Complete Streets and micromobility services.
- » Program projects to remediate bottlenecks identified during data collection and performance assessments.

4.5.5 PERFORMANCE MEASURES

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirement:

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

The performance measures listed below will assist in measuring progress toward this vision goal and its objectives, and in informing investment decisions:

- » Performance measures designated for NYMTC's CMP and detailed in the 2025 CMP Status Report.

4.6 VISION GOAL—LAND USE

We seek to establish and maintain a transportation system for which land use decisions are encouraged in support of strategic transportation enhancements and improving modal choices.

4.6.1 DESCRIPTION

Land use and transportation are inextricably linked. Optimizing this relationship requires collaboration and alignment at all levels of Government. Strategic and sustainable development can be encouraged by undertaking land use planning, zoning, and transportation planning in tandem, thus encouraging land use planning and decision-making reinforcing and supporting transportation investments and services to move people and goods more efficiently throughout NYMTC's planning area. Doing so will decrease community impacts, improve accessibility to services, support healthy living conditions, and reinforce economic vitality.

4.6.2 OBJECTIVES

- » Encourage TOD as well as parking, curb, and property management, micro-mobility pathways and other long-term sustainable land use strategies that support passenger and goods movement while reducing pollution.
- » Encourage strategic distribution of growth throughout the region by prioritizing density over less dense development near transit, and by prioritizing transit investments where development is occurring.
- » Help create/sustain vibrant communities through placemaking.
- » Leverage land use mechanisms to improve access to destinations.
- » Manage the First-Mile, Last-Mile planning process through collaboration with transportation and land use planning officials and affected stakeholders.
- » Consider the impacts that transportation policies and projects will have on land values and proactively mitigate negative effects on existing communities.

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4.6.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

NYMTC's planning area encompasses 189 local municipalities, including the City of New York, resulting in a region that is exceptionally complex in terms of land use planning and decision-making. NYS constitution grants municipalities and/or counties the ability to pass laws to govern themselves as they see fit (so long as

the laws do not conflict with the state and Federal constitutions), and specifically on matters related to land use and zoning. Thus, local land use planning is the domain of the local municipalities—cities, towns and villages—in NYMTC’s planning area. Five suburban counties in the planning area each have charters governing land use responsibilities, which are generally advisory to the local municipalities within their borders. Their direct land use responsibilities are usually limited to land and facilities that they own.

According to New York State’s online information on Land Use Planning and Regulation:

Police power is the power Government has to provide for public order, peace, health, safety, morals and general welfare. It resides in the sovereign state but may be delegated by the State to its municipalities. Land use controls are an exercise of the police power long recognized by the United States Supreme Court. In New York, the power to control land use is granted to each municipal Government by reference in Article IX, section 2, of the State Constitution and by the various state enabling statutes.

With few exceptions, the exercise of the police power to control land use is a city, town or village function in New York State. This includes the decision whether to control land use, and, if so, to determine the nature of the controls. When exercised, the power to control land use is governed by the state enabling statutes which have granted the power to local governments. The General City Law, the Town Law, the Village Law, the General Municipal Law, the Municipal Home Rule Law and its companion Statute of Local Governments.

New York’s counties have the statutory power to create planning boards (General Municipal Law section 239-c). The county legislative body may prepare a county comprehensive plan or delegate its preparation to the county planning board or to a “special board” (General Municipal Law section 239-d). Prior to adopting or amending a county official map, the county legislative body must refer the proposed changes to the county planning board and other municipal bodies (General Municipal Law section 239-e). In addition, the county legislative body may authorize the county planning board to review certain planning and zoning actions, including certain subdivision plats, by municipalities within the county (General Municipal Law section 239-c(3)).

State laws require that any city, town or village located in a county possessing a “county planning agency” or “regional planning council” must refer to that agency certain zoning matters before taking final action on those matters. In addition, where authorized by the county legislative body, certain subdivision plats must be referred to the county by the town, village or city planning board before taking final action. Generally, referral must be made where a proposed zoning matter or subdivision plat affects real property within 500 feet of one or more enumerated geographic features, such as a municipal boundary. Referral to the county planning agency or regional planning council is an important aid to the local planning and zoning process. It provides local planning and zoning bodies with advice and assistance from professional county and regional staff and can result in better coordination of zoning actions among municipalities by interjecting inter-community considerations. In addition, it allows other planning agencies (county, regional and state) to better orient studies and proposals for solving local as well as county and regional needs.

Land use planning is focused on how land is used now and in the future. Zoning is the exercise of the police power to control land use by determining the usage and development of a specific area.

The Comprehensive Plan (also called a Master Plan) forms the basis, the blueprint, for all municipal planning and development. These plans have a multi-decade horizon and may be updated periodically. They provide overall guidance for zoning ordinances and actions and provide land use recommendations. These plans also address planned infrastructure projects in water supply & sewage; housing; recreation and open spaces; commercial development; natural resources management and land use in general, as well as transportation infrastructure.

For all municipalities in NYMTC's planning area, the Comprehensive Plan and/or zoning ordinance form the basis of local land use planning and control. For the counties in the planning area, except for Putnam County, in keeping with the provisions of New York State's General Municipal Law, legislative bodies have directed county planning boards to prepare a county comprehensive plan. Under the law, these county comprehensive plans establish the following:

- » All county land acquisitions and public improvements, including those identified in the county official map adopted or amended pursuant to this article, shall be in accordance with a county comprehensive plan, if one exists.
- » All plans for capital projects of a municipality or state governmental agency on land included in the county comprehensive plan adopted pursuant to this section shall take such plan into consideration.

The City of New York relies on its Zoning Resolution as a comprehensive set of zoning regulations. It defines the rules for land use, building sizes, setbacks, open space, and more. The resolution is regularly updated and amended by city agencies, and it includes regulations for various types of development. Major land use changes, such as rezonings and large development projects, go through the Uniform Land Use Review Procedure, which involves multiple stages of public review, including input from community boards, borough presidents, city agencies, and the City Council.

Land use planning coordination at a more regional level is undertaken in NYMTC's planning area through two regional planning councils formed at the agreement of their constituent county jurisdictions. The Hudson Valley Regional Council includes seven counties in the Hudson Valley, three of which are NYMTC members—Westchester, Rockland and Putnam counties. The Long Island Regional Council is comprised of Nassau and Suffolk counties.

Taken together, these land use planning and zoning mechanisms control and coordinate land uses in the NYMTC planning area in a decentralized, fragmented fashion. The land use planning and zoning decisions which are the purview of 189 municipalities form the de facto regional land use plan for the planning area. Except for the City of New York, NYMTC's members exercise only advisory influences over these land use and zoning decisions.

Although transportation can be a component of municipal and county comprehensive plans, mechanisms for transportation planning fall under jurisdictional structures which are both similar and different. Local

municipalities are responsible for the transportation infrastructure or services—including streets and roadways—that they own or operate. That is true for counties, also. NYS also owns or has responsibility for arterial roadways and limited-access highways, as well as various public transportation services. Finally, public authorities also own transportation facilities and services within NYMTC’s planning area, including the MTA, PANYNJ, New York State Thruway Authority and New York State Bridge Authority.

Planning for the preservation, operation and expansion of these facilities and services is undertaken initially on a jurisdictional basis, each jurisdiction being responsible for planning for their facilities and services. Regional coordination of these planning activities takes place through an MPO such as NYMTC. Comprised of the owners and operators of transportation facilities and services, MPOs exist to plan for the use of Federal transportation funding. MPOs are required by the Federal legislation which authorizes the availability of this funding nationally. MPOs have no formal jurisdiction over land use planning within their planning areas, although Federal regulations require that land use plans be accounted for in the mandated regional transportation planning process.

LAND COVER

Land cover data documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, while land use refers to how people use the landscape—whether for development, conservation, or mixed uses. The result of the decentralized structure of land use planning in the NYMTC planning area can be illustrated using the National Land Cover Database for NYMTC’s planning area.

Table 4.4 presents land cover classes and their gain/loss over the period 2001—2021. For each county/borough in NYMTC’s planning area, the table presents percentages of developed land classified as high intensity (HI), medium intensity (MI) and low intensity (LI); along with developed open space (DOS) and undeveloped land (UL).

- » **Developed—High Intensity:** Highly developed areas where impervious surfaces account for 80 to 100 percent of land cover.
- » **Developed—Medium Intensity:** Mixture of constructed areas and vegetation where impervious surfaces account for 50 to 79 percent of land cover.
- » **Developed—Low Intensity:** Mixture of constructed areas and vegetation where impervious surfaces account for 20 to 49 percent of land cover.
- » **Developed—Open Space:** Mixture of some constructed materials, but mostly vegetation typically including large-lot single family housing, parks, and golf courses where impervious surfaces account for less than 20 percent of land cover.
- » **Undeveloped:** Includes barren land, forests, shrubland, herbaceous, planted/cultivated, and wetlands.

Table 4.4 demonstrates that counties and boroughs have experienced an increase in the percentage of high and medium intensity developed land over the last two decades; combined in most cases with a decrease in low intensity developed land and developed open space. Figure 4.23 compares the total

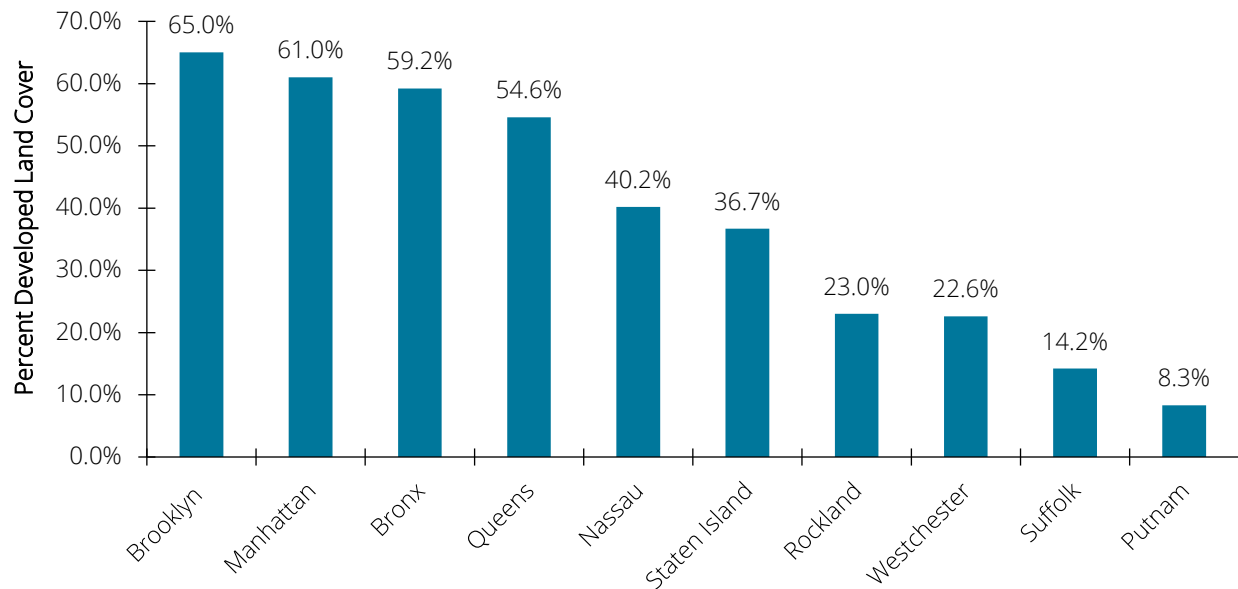
percentage of high, medium, and low intensity developed land percentage for each borough/county. Brooklyn and Manhattan are both above 60 percent developed land cover, while counties in the Lower Hudson Valley range from 8.3 percent (Putnam) to 23 percent (Rockland) developed land cover.

Table 4.4 Land Cover Classes by County/Borough

Borough/ County	2021 Land Cover Share					2001–2021 Change			
	High Intensity (HI) %	Medium Intensity (MI) %	Low Intensity (LI) %	Developed Open Space (DOS) %	Undeveloped Land (UL) %	HI % Change	MI % Change	LI % Change	DOS % Change
New York City									
Brooklyn	47.3%	13.8%	3.9%	2.1%	32.9%	1.3%	2.5%	-11.8%	-13.5%
Manhattan	44.2%	12.2%	4.6%	4.9%	34.1%	2.8%	11.0%	-9.1%	-7.7%
Bronx	33.1%	18.8%	7.3%	6.2%	34.6%	3.7%	5.1%	-6.8%	-1.1%
Queens	28.8%	19.9%	5.9%	2.4%	43.0%	1.4%	2.0%	-6.7%	-10.6%
Staten Island	8.6%	20.3%	7.8%	4.9%	58.4%	7.6%	5.4%	-4.2%	-9.2%
Suburban Counties									
Nassau	7.1%	21.1%	12.0%	11.3%	48.5%	3.3%	2.9%	-0.3%	-2.8%
Westchester	3.3%	7.8%	11.5%	18.7%	58.7%	9.5%	14.2%	5.6%	1.9%
Rockland	2.2%	7.7%	13.1%	16.7%	60.3%	21.6%	21.4%	6.7%	3.2%
Suffolk	1.5%	4.9%	7.8%	7.8%	78%	13.6%	10.9%	2.2%	-1.1%
Putnam	0.5%	2.6%	5.2%	9.3%	82.4%	29%	22.3%	9.4%	2.7%

Source: National Land Cover Database.

Figure 4.23 Comparison of Developed Land Cover



Source: National Land Cover Database.

EXISTING INITIATIVES

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Several overarching land use and transportation planning initiatives relevant to this shared goal are outlined below:

COORDINATED DEVELOPMENT EMPHASIS AREAS AND HOUSING GROWTH AREAS

Moving Forward 2055 identifies a variety of Coordinated Development Emphasis Areas (CDEA) and Housing Growth Areas (HGA) across NYMTC's planning area. These are geographic areas where land development and transportation investment planning are or will be established to create linkages to further integrating planning for transportation, housing, and development. CDEAs and HGAs have the potential to shape future growth and the way the transportation system accommodates that growth. They are important to achieving the Plan's Shared Vision for Regional Mobility by creating stronger linkages between land use decisions made at the local level and transportation investment decisions made at the planning area level.

By encouraging investments in development and transportation in a coordinated fashion, CDEAs and HGAs also provide a framework that can foster more efficient, sustainable growth, and help mitigate environmental pollution while conserving land and strengthening economic vitality. See Appendix A of *Moving Forward 2055* for the Plan's CDEA and HGA maps.

COMMUNITY PLANNING WORKSHOP PROGRAM

Using the CDEAs and HGAs as a targeting mechanism, NYMTC funds a continuing program of community planning activities that:

- » Encourage “compact” development in centers and downtowns to reinforce walkable, aesthetically pleasing, and transit-accessible environments, while managing vehicular access and parking.
- » Encourage consideration of local transportation issues in comprehensive/master planning and community visioning processes.
- » Make walking and biking safer and more convenient through safety and streetscape improvements, hiking and mixed-use paths, bike lanes, etc.
- » Support downtown development/redevelopment.
- » Repurpose available unused / underused real estate (office spaces); parking lots, etc.
- » Consider first mile/last mile transit station and/or service access.

MTA FIRST-MILE/LAST-MILE (FMLM) TOOLKIT

MTA developed this toolkit as a resource for regional communities and other interested parties to encourage implementation of improved, fair, and environmentally friendly ways for travelers to access MTA LIRR and MTA MNR commuter rail stations in New York suburbs, providing users with a step-by-step guide for identifying and developing potential FMLM strategies to implement or test as a pilot program.¹⁵

TRANSIT ORIENTED DEVELOPMENT (TOD) INITIATIVES

TOD aims to develop commercial hubs and neighborhoods near transit stations and/or services. Denser, mixed-use neighborhoods near transit also tend to be more cost- and maintenance-efficient due to the type of housing and development. Downtown cores of smaller municipalities, in lower density areas, can benefit as well, by incorporating TOD principles in their planning to create mixed-use, walkable, more active, and somewhat denser centers. Notable TOD programs currently underway include:

- » **MTA TOD Program**—MTA plans and advocates for compact, mixed-use communities around MTA train stations and works to make sure our stations are well-integrated and accessible by foot, bike, and personal wheeled vehicles. As part of the MTA's efforts to make system access fairer and more sustainable, the TOD Program makes use of the FMLM Toolkit described above. The TOD Program also works closely with municipal planners to innovate and administer zoning tools that leverage private development into critical station access and circulation improvements.
- » **Bronx Metro-North Area Plan**—Associated with a major transportation improvement project to establish MTA MNR access to Penn Station on the west side of Manhattan, four new MTA Metro-North stations will be constructed in the east Bronx communities of Parkchester/Van Nest, Morris Park, Hunts Point, and Co-op City. Stations will connect East Bronx to both southwestern Connecticut and to Penn Station. Land development around these new stations will create nearly 7,000 residential units, as well as 10,000 jobs, all of which will be close to public transit.
- » **Wyandanch Rising, Suffolk County**—The Wyandanch Rising revitalization initiative aims at addressing longstanding issues in Wyandanch in the Town of Babylon. The Town acquired more than 70 properties for the project site and built out the infrastructure necessary for the

development. Affordable housing development is ongoing. Other facilities include a new park, a newly opened MTA LIRR station house, and a 500-car commuter parking garage.

- » **Nanuet Hamlet Center, Rockland County**—This TOD project around the Nanuet train station is intended to develop a traditional “main street” neighborhood that provides the opportunity for mixed-use development and a variety of multi-generational housing options for residents seeking to live near, and utilize, transit service. Improved sidewalks and parking infrastructure, green spaces, connectivity to transit, emphasis on bicycle and walking, infill development, aim to preserve the “small-town feel” and identity of the hamlet, yet also create a vibrant, diverse neighborhood.
- » **Brewster Main Street, Putnam County**—Development in the Village of Brewster near its MTA Metro-North station will add over 408 new housing units and include businesses, municipal offices, parking spaces, etc. Completion of the first phase is expected by 2027.

SIGNIFICANT REZONINGS

- » **City of Yes Zoning Initiatives**—Between 2023 and 2025, New York City’s zoning resolution underwent a substantial overhaul to support small businesses, facilitate greater housing production, and promote sustainability. These changes included several initiatives to support transit-orientated development, including removing parking requirements and allowing denser buildings in transit-rich areas.
- » **Atlantic Avenue Mixed Use Plan (AAMUP), Brooklyn**—This rezoning, which passed the City Council in the Spring of 2025, was a community-led planning process geared toward supporting an inclusive, mixed-use stretch of Atlantic Avenue and neighboring blocks in Crown Heights and Bedford-Stuyvesant. The plan supports new and affordable housing, new space for jobs and services, safer, more pedestrian-friendly streets and investments in neighborhood improvements.
- » **Jamaica Neighborhood Plan, Queens**—Jamaica is a major transportation hub for the borough of Queens. Zoning changes are being considered that would help Jamaica grow and thrive, with up to 12,000 new homes including around 4,000 permanently income-restricted affordable homes in a 230-block area of Jamaica. These changes would also create more opportunities for businesses, bringing new jobs to residents and economic growth to the area. Beyond these zoning changes, the plan would include strategic investments to enhance infrastructure, transit access, open space, and more.
- » **Long Island City Neighborhood Plan, Queens**—The City of New York seeks to increase the supply of permanently affordable housing, expand open space opportunities and waterfront access, promote job growth, address critical infrastructure capacity issues and plan for the future resiliency of the neighborhood.
- » **Midtown South Mixed Use Plan (MSMX), Manhattan**—This neighborhood plan is designed to foster vibrant, 24/7 mixed-use neighborhoods across 42 blocks of Manhattan’s Midtown South by expanding housing, bolstering economic activity, and enlivening the public realm. The plan would map new high-density residential districts to generate around 9,700 homes, up to 2,800 of them permanently income-restricted, in areas with excellent transit access and where housing today is not permitted.

- » **Connect Long Island, Suffolk County**—Suffolk County's transportation and development plan to support TOD and create an innovation economy and sustainable growth alongside open space preservation. The Long Island I-Zone is a component of Connect Long Island which seeks to integrate major innovation and transportation assets in and around the County Route 97/Nicolls Road corridor and linking three MTA LIRR lines in a north-south direction. Connect Long Island also includes the Ronkonkoma Hub TOD, Ronkonkoma South, and connectivity to MacArthur Airport.
- » **District Galleria, Westchester County**—Proximate to the White Plains TransCenter, District Galleria is one of the largest enclosed shopping mall conversions in the tri-state area with a cost near \$2.5 billion. Zoning is to align with the City of White Plains' TOD goals. The mall is to be demolished to make way for the construction of a mixed-use complex of seven residential towers, retail and commercial spaces, pocket parks, and open space.
- » **Southwest Yonkers, Westchester County**—The City of Yonkers has been actively redeveloping its downtown with projects like Saw Mill Lofts and riverfront housing aimed at leveraging proximity to MTA MNR stations and Bee-Line System buses. Yonkers adopted the Ludlow Street Transit-Oriented Development Plan Adoption and Zoning Amendments in 2020, to revive a brownfield area that had not seen improvements in decades. Various development sites have reshaped Yonkers neighborhoods and have attracted investments.

4.6.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contains the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Benchmarking research on best practices for aligning land use policies with transportation investments from other metropolitan regions.
- » Identify resources and funding programs available for advancing TOD and housing development.
- » Research linkages between transportation investments/services and land values.

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Update the regional land use database.
- » Develop and maintain a repository for county and municipal comprehensive/master plans as input for the regional land use database and for the disaggregated socio- economic/demographic (SED) forecasts.
- » Maintain an inventory of development projects for the three NYMTC subareas.
- » Produce an annual report of TOD project status.
- » Establish Key Performance Indicators that can be used to evaluate TOD progress.
- » Track zoning changes, development trends, and land use patterns in areas along transit corridors.

PLANNING PROCESS RECOMMENDATIONS

- » Through the Community Planning Workshops (CPW) program, engage local communities and other stakeholders to identify potential TOD sites and projects using CDEAs and HGAs identified in Appendix A as a strategic guide.
- » Use MTA's FMLM Toolkit for TOD projects undertaken through the CPW program.
- » Monitor the status and development of the CDEAs and HGAs identified in Appendix A through the PFAC Land Use Subcommittee.
- » Expand the PFAC Land Use Subcommittee to include local municipality representatives and mobility service providers.
- » Collaborate with the local governments to ensure that transportation systems align with land use decisions.
- » Explore visioning initiatives and Planning and Environmental Linkages studies to explore alternatives for targeted TOD projects.

PROGRAM RECOMMENDATIONS

- » Develop illustrative zoning incentives for higher-density development near transit nodes.
- » Develop placemaking and community design guidance for local municipalities.

4.6.5 PERFORMANCE MEASURES

PERFORMANCE METRICS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirements:

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

The performance measures listed below will assist in measuring progress toward this vision goal and its objectives, and in informing investment decisions:

- » At the county/borough level, the percentage in each of the land cover classes and relative gain/loss.
- » Percent of commercial and residential development within one-half mile of a transit stop.
- » Number of active TOD projects.
- » Key Performance Indicators recommended above that can be used to evaluate TOD progress.

4.7 VISION GOAL—FAIRNESS & ACCESS

We seek to establish and maintain a transportation system for which fairness in transportation is advanced and access to opportunities is improved for all communities.

4.7.1 DESCRIPTION

The transportation system in NYMTC's planning area functions to provide mobility and access for residents and goods, defining mobility as the ability or capacity to move about the planning area, and defining access the ability to obtain or make use of various services or activities for those living in and visiting the area. However, the system does not provide these important capabilities equally for all communities given topography, distance, existing infrastructure, and resource constraints. As outcomes of NYMTC's planning process, this goal seeks to advance the levels of mobility and improve access to social, economic, recreational, and medical services for communities within NYMTC's planning area to improve overall access to opportunities for every member of the traveling public.

Additionally, this goal seeks to incorporate the policies of NYMTC's Title VI/Non-Discrimination Program in its metropolitan planning process, as well as in the execution of that process and the plans, programs, and projects which result. The Title VI/Non-Discrimination Program establishes NYMTC's commitment to non-discrimination to ensure that all plans, programs, procedures, policies, and activities do not have disproportionate adverse effects on minority and low-income populations. It is also the policy of NYMTC that minority and low-income communities will be engaged to facilitate their full and fair participation in the metropolitan transportation planning process. More detail on the region's communities of concern and other socioeconomic characteristics are available for viewing in the [Moving Forward 2055 Interactive Map](#).

4.7.2 OBJECTIVES

- » Improve first- and last-mile access to transit.
- » Improve accessibility to the transportation system for users of all abilities.
- » Provide more frequent and reliable transit service.
- » Strategically expand transportation services and information to enhance mobility in communities with the greatest mobility needs.
- » Improve access to social and economic opportunities for all populations, regardless of age, ability, race, ethnicity, or income.

4.7.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

Understanding the mobility characteristics of the NYMTC planning area is essential to shaping a transportation system meeting needs of a diverse and evolving population. Recent social, economic, and technological developments are influencing how transportation is designed, provided, and consumed in NYMTC's planning area. Developments provide context for this vision goal and its objectives to respond effectively to current challenges and opportunities.

NYMTC's planning area encompasses a highly diverse population, including individuals of numerous racial, ethnic, income, and language backgrounds with diverse mobility characteristics. According to the 2023 American Community Survey (ACS) from the U.S. Census Bureau, 41 percent of planning area households—over 1.9 million households—do not have access to a private vehicle. Another 32 percent have access to one private vehicle. Of planning area workers 16 years old and older who did not work from home, 37 percent traveled over 45 minutes to work, with another 25 percent traveling 30 to 44 minutes to work.

The 2023 ACS also indicates 38 percent of the 12.8 million people residing in the planning area fall in age ranges with significant mobility limitations: 17 years old and younger (21 percent) and 65 years old and older (17 percent), with 11 percent of planning area residents having a disability.

The planning area's minority population—as defined through 2023 ACS—totaled 7.7 million residents and 60 percent of the planning area's total population. New York City had the largest percentage of minority population, with 69 percent or nearly 5.9 million people. Long Island's minority population totaled 1.2 million people or 41 percent of its total population, and the Lower Hudson Valley had a minority population of 658,470, approximately 46 percent of its total population. Approximately 40 percent of NYMTC's planning area residents were non-Hispanic white, 26 percent were Hispanic or Latino, 17 percent were non-Hispanic Black or African American, and 12 percent were non-Hispanic Asian. The remaining 5 percent were American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, and other or mixed race.

Regarding household income, approximately 14 percent (1.8 million people) of the planning area's population lived in households at or below the defined poverty level, according to the 2023 ACS. Long Island had the lowest proportion of population at or below the poverty level with 6 percent (approximately 168,000 people), followed by the Lower Hudson Valley with 10 percent (approximately 145,000) and New York City with 17 percent (approximately 1.5 million).

As described in Appendix G to *Moving Forward 2055*, low-income and minority populations in the planning area have significantly different mobility characteristics due to limitations in mobility options and information that present challenges to reaching employment centers, healthcare facilities, education centers, and other essential destinations. Because of mobility challenges, these areas, among others, are identified as Communities of Concern (CoC) in the NYMTC planning process from the perspective of transportation fairness and access to opportunity. A full description of CoCs appears in Appendix G to *Moving Forward 2055*.

As described in Chapter 3 of *Moving Forward 2055*, regional population is expected to continue to grow and diversify, with new demands on the transportation system and challenges in the context of this vision goal, such as:

- » Increases in the number and proportion of senior citizens will continue to drive greater demand for accessible transit options, demand-responsive and paratransit services, and pedestrian-friendly transportation facilities and infrastructure.
- » Due to increases in cost-of-living and housing costs, lower income households will continue to face limitations in their mobility options.
- » As immigrant populations and multilingual households grow, language barriers will continue to limit access to transportation information and mobility options.
- » Advances in technology and transportation innovations are transforming the transportation system, but not all communities are benefiting equally from these innovations. For example:
- » CoCs often experience barriers to real-time transportation information about available mobility options and opportunities for employment, training, healthcare, etc.
- » Cleaner transportation technologies reduce vehicular pollution, but economic characteristics limit access to these advancements, as well as their benefits in CoCs.
- » Rapid expansion of shared micromobility conveyances and services involving bicycles, e-bikes, and scooters, etc., has resulted in uneven access in CoCs to these conveyances and related services.

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Additionally, frequent extreme weather is placing new stresses on the transportation system and impacting communities based on their location. CoCs often experience greater disruptions given their locations, mobility limitations, and a lack of access to emergency transportation information.

EXISTING INITIATIVES

Numerous initiatives in NYMTC's planning process are aimed at fair transportation and access across NYMTC's planning area through the inclusive planning process. By embedding access considerations into planning, funding, and implementation, NYMTC is working to create a fairer transportation network that provides greater access to opportunity for all of the traveling public. Initiatives are outlined below:

- » **Transit Service Coordination Needs Assessment**—As recommended in *Moving Forward 2055's* predecessor Plan, this project is assessing transit service coordination needs across jurisdictional lines to evaluate intermodal connections with the objective of improving the integration of the multimodal transit network in the NYMTC planning area.
- » **Community Planning Workshops**—This project enables NYMTC's members agencies to develop community workshops whose locations are consistent with the Coordinated Development Emphasis Areas identified in Appendix A. The workshops will provide planning assistance to local municipalities and community boards and will facilitate discussions enabling participating communities to develop, evaluate and implement improvements consistent with the Shared Vision for Regional Mobility presented in Chapter 1.

- » **MTA's First Mile Last Mile (FMLM) Toolkit**—Developed as a resource for communities and other interested parties (users) to encourage implementation of improved, fair, and environmentally friendly ways for travelers to access commuter rail services.¹⁶
- » **Overcoming Information Barriers**—MaaS is a type of service that enables users to plan, book, and pay for multiple types of mobility services through an integrated platform.¹⁷ Transportation services from public and private transportation providers are combined through a unified gateway, usually via an app or website. 511 New York (511NY) is a free, one-stop, all-encompassing telephone and Web service offering information on transportation services and conditions throughout New York State. The service offers trip-planning resources, information on traffic conditions, weather updates and alternative transportation information.
- » **Assessing Patterns of Mobility and Investment**—NYMTC is responsible for programming transportation projects which will make use of Federal funding. When assessed geo-spatially, programmed projects form a pattern of intended investment in transportation facilities and equipment that can be assessed relative to the CoCs. This assessment is presented in Appendix A and Appendix G.
- » **Inclusive Public Engagement**—Multilingual and culturally sensitive outreach is advanced through NYMTC's Language Access Operating Procedures and Public Involvement Plan. NYMTC's Thriving Communities Network increases involvement from CoCs and their representatives in the metropolitan transportation planning process. Through the Network, partnerships with community organizations and advocacy groups working in or with CoCs have strengthened inclusive engagement. Additionally, community inclusion is an important consideration in the development of public outreach activities for NYMTC's required planning projects and specific subarea, corridor and technical studies undertaken by NYMTC and/or its individual member agencies.
- » **Information Sharing for Project Solicitations and Funding Availability**—Through mechanisms such as the Thriving Communities Network and lists of non-profit organizations and human services transportation providers developed for the Coordinated Public Transportation/Human Services Transportation Plan that is Appendix E, NYMTC is sharing information related to relevant project solicitations and funding availability with many organizations that operate in or support CoCs.
- » **Advisory Working Groups and Study Advisory Committees**—Using information channels previously described, NYMTC has also expanded community access to the regional planning process through participation with topical Advisory Working Groups and advisory committees for specific subarea, corridor and technical studies undertaken by NYMTC and/or its individual member agencies.
- » **Universal Design**—Universal design is usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.³ Consideration of universal design and access has become more prominent, with agencies adopting policies that go beyond legal compliance in some cases.

4.7.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contain the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Inventory all potential funding sources for first mile/last mile services and for accessibility.
- » Inventory current and developing technology that can be used to improve first- and last-mile services, information, and accessibility.
- » Target community planning workshop offerings to key system interfaces established in Transit Service Coordination Needs Assessment.
- » Assess the level of accessibility for all transit services in the planning area.
- » Perform benchmarking research on mobility assessments in peer regions.
- » Develop a mobility index for all communities in the planning area.
- » Assess service levels relative to the Mobility Index.

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Annually update data for indices related to mobility and update CoC designation and assessment with each new Regional Transportation Plan.
- » Monitor the key system interfaces established through the Transit Service Coordination Needs Assessment.
- » Establish an annual scorecard of the level of accessibility for all transit services in the planning area.
- » Quantify service levels by census tract throughout the planning area.

PLANNING PROCESS RECOMMENDATIONS

- » Plan and implement the service accessibility assessment through the DRs' Working Group.
- » Consider the findings of the Transit Service Coordination Needs Assessment at the transportation coordinating committees.

PROGRAM RECOMMENDATIONS

- » Implement recommendations of the Transit Service Coordination Needs Assessment.
- » Continue relevant project selections through the Section 5310 funding program.

4.7.5 PERFORMANCE MEASURES

PERFORMANCE METRICS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirement:

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

The performance measures listed below will assist in measuring progress toward this goal and its objectives, and in informing investment decisions:

- » On-time performance overall for transit service and for key interfaces as determined through the Transit Service Coordination Needs Assessment.
- » Transit ridership overall and for key interfaces as determined through the Transit Service Coordination Needs Assessment.
- » Non-Discrimination Index as defined in Appendix G.
- » Mobility Index indicating relative mobility characteristics across the planning area.
- » Accessibility scorecard for transit services throughout the planning area.
- » Investment assessment as defined in Appendix A and Appendix G.



4.8 VISION GOAL—ENVIRONMENT

We seek to establish and maintain a transportation system for which environmental impacts—including harmful air pollutants—are significantly reduced through technology applications, increased use of greener travel options, and improved system efficiency.

4.8.1 DESCRIPTION

This goal focuses on long term environmental stewardship and reducing harmful pollutants from the operation, preservation, and enhancement of the transportation system. The goal seeks to minimize the transportation system's environmental impacts through land use measures, environmental stewardship, managing vehicular travel, promoting lower impact vehicle technologies, and mitigating community impacts. NYMTC's member agencies have individual policies for addressing the impacts of transportation on the environment and have established this goal to continue and amplify those efforts when they come together as NYMTC. More detail on various critical environmental assets within the NYMTC planning area are available for viewing in the [Moving Forward 2055 Interactive Map](#).

4.8.2 OBJECTIVES

- » Support land use sustainability through improved and efficient transportation services and facilities, which enable more efficient land use.
- » Practice environmental stewardship to maintain and enhance the transportation system.
- » Promote and improve public transportation and active transportation modes, such as walking and cycling, to reduce pollution, improve air quality and support public health.
- » Support lower- and zero-emission alternatives to current trucking through vehicle technology and greater modal balance.
- » Modernize public vehicle fleets to lower- and zero-emission vehicles and support the conversion of private vehicles.
- » Efficiently manage limited roadway capacity to mitigate congestion and vehicular pollutants.
- » Address the unequal impacts of transportation sector pollution on certain communities.

4.8.3 RECENT TRENDS, CURRENT CONDITIONS, AND EXISTING INITIATIVES

RECENT TRENDS AND CURRENT CONDITIONS

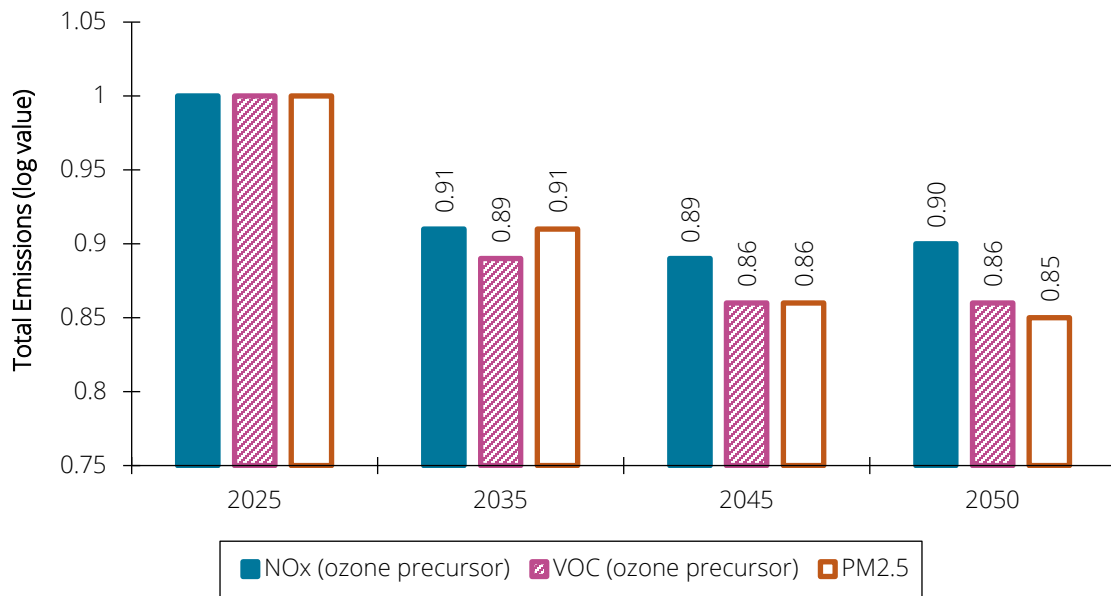
Over the last several decades, some environmental effects from transportation have been mitigated through regulation, technological advances, and system improvements made over time using Federal, state, and local funding. These efforts are related to the ultimate achievement of the National Ambient Air Quality Standards (NAAQS) set under the Clean Air Act Amendments of 1990 (CAAA90) and the mitigation of the transportation system's contributions to pollution and overall environmental impact.

Criteria pollutants defined by CAAA90 can harm human health and the environment, and cause property damage.¹⁸ Pollutants include Carbon Monoxide, Lead, Nitrogen Dioxide (a pollutant emitted by cars, trucks, buses, power plants), Ozone, Particulate Matter, and Sulfur dioxide a pollutant that is a combustion product released by burning fossil fuels. Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a NAAQS is in non-attainment.¹⁹ CAAA90 stipulates state governments must establish several types of State Implementation Plans (SIP) to address non-attainment areas at different spatial scales and detail how a state plans to maintain and meet the National Ambient Air Quality Standards (NAAQS) in those areas.²⁰ The NYS SIP contains regulations and documents used to reduce air pollution in areas not meeting NAAQS required by CAAA90 and set by the U.S. Environmental Protection Agency (EPA) for criteria pollutants.²¹

NYMTC prepares Transportation Conformity Determinations that ensure that the transportation projects and programs in its Transportation improvement Program and Regional Transportation Plan do not exceed the motor vehicle emissions budgets²² set by the NYS SIP in relation to relevant nonattainment areas and maintenance areas, which are former nonattainment areas that are demonstrating maintenance of the NAAQS, that impact NYMTC's planning area.

Figure 4.24 below presents forecasted trends for key criteria pollutants from the most recent NYMTC Transportation Conformity Determination. Logarithmic transformations of the data values are used in the figure.

Figure 4.24 Comparative Pollution Forecasts (in log values)



Source: 2024 NYMTC Transportation Conformity Determination.

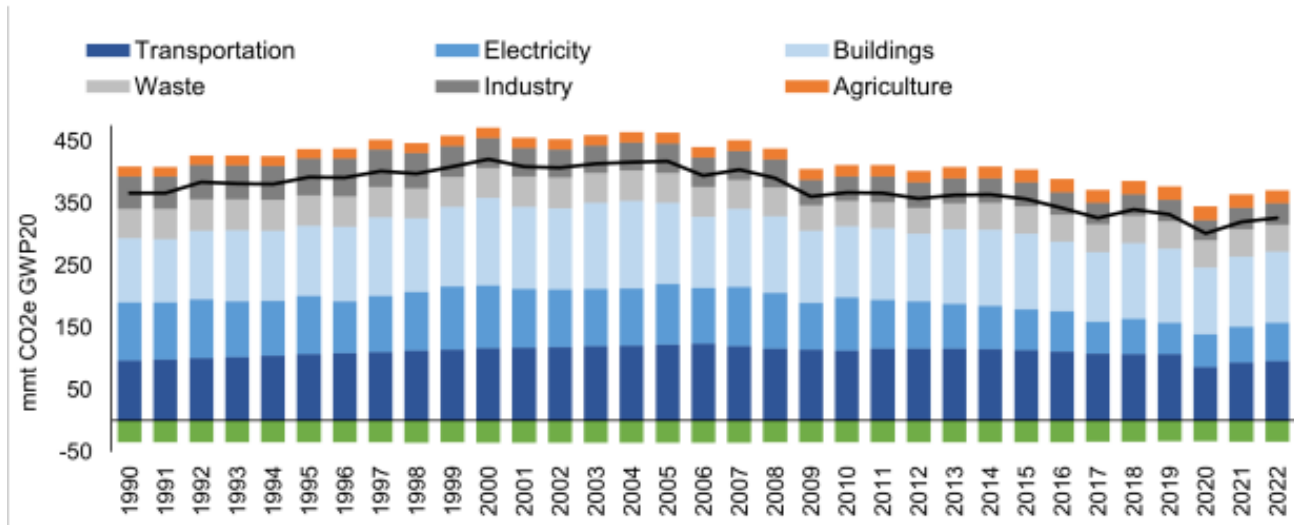
SOURCES OF POLLUTANTS

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Pollutants in the atmosphere can create negative public health impacts and environmental damage. Examples of notable pollutants include carbon dioxide (CO₂), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Carbon dioxide from human activity such as the burning of fossil fuels for electricity, heat, and transportation, comprises the largest share of these pollutants.²³

Sources of the aforementioned six pollutants in New York State include vehicle fuel combustion in the transportation sector (19 percent) followed closely by fuel combustion in the residential, commercial, and industrial sectors (18 percent). Fuel combustion for electricity generation (including net imports) represents 7 percent. Other sources (e.g., industrial process, agriculture, and waste) combine for 25 percent statewide, while fugitive, or unintentional, emission, leakage, or discharge of gases or vapors from various sources, account for 4 percent.. Out of state sources also contribute to pollution in New York State.²⁴

As illustrated in Figure 4.25, levels of carbon dioxide in NYS increased from 1990 and peaked in 2005, but have since declined. Since 1990, there has been a substantial decrease in carbon dioxide generated by fuel combustion for electricity generation as well as a decrease in fuel combustion for industrial purposes. Pollution from all other energy sources was slightly lower in 2022 compared to 1990.

Figure 4.25 New York State Notable Pollutants by Economic Sector

Source: 2024 Statewide GHG Emissions Report, NYSDEC.

EXISTING INITIATIVES

- » **Climate Leadership and Community Protection Act**—New York State's 2019 Climate Leadership and Community Protection Act (CLCPA) aims to achieve economy-wide carbon neutrality. The CLCPA works alongside other State efforts to reduce the financial impact and increase the quality of life for residents of the state of New York, with a focus on affordability, justice, and grid reliability. The CLCPA established a CLCPA Council responsible for developing a scoping plan to help meet the law's requirements. This includes aggressive pollution reduction and electrification goals for the years 2030, 2040, and 2050.
- » **Transportation Conformity**—Conformity is defined as "*a Clean Air Act (42 U.S.C. 7506(c)) requirement that ensures that Federal funding and approval are given to transportation plans, programs and projects that are consistent with the air quality goals established by a State Implementation Plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS or any required interim emission reductions or other milestones in any nonattainment or maintenance area. The transportation conformity regulations (40 CFR part 93, subpart A) sets forth policy, criteria, and procedures for demonstrating and assuring conformity of transportation activities.*"²⁵
- » **TSMO**—TSMO strategies, programs, and improvements can lead to safer roads, reduced vehicular travel demand, less traffic congestion, and higher transit utilization. TSMO refers to the integrated strategies to optimize transportation infrastructure through projects and programs designed to operationally maximize capacity and improve the safety and reliability of the transportation system.
- » TSMO measures are intended to improve the efficiency of the transportation system in moving people and goods and can offer high returns on lower cost operational projects and programs. Additionally, these strategies can help reduce transportation pollution by maximizing system

efficiency. TSMO also seeks to improve the safety, security, and resiliency of the transportation system, and to optimize travel times and costs for all travelers.

- » Among the TSMO measures implemented in NYMTC's planning area are various types of ITS, web-based traveler information and trip planning services, better integrated roadway and transit management and operations, various forms of transportation demand management programs that promote alternatives to single-occupant vehicle (SOV) travel (e.g., transit, ridesharing, parking management programs, telework). Highlights of current TSMO measures active or under development in the NYMTC planning area include:
 - Transportation Demand Management (TDM) programs provide a more integrated, convenient, and accessible transportation network for travelers. TDM programs in the NYMTC planning area are built around 511NY, which provides transportation information and alternatives to driving alone. Under the umbrella of 511NY, outreach is undertaken to employers, commuters, and members of the public to provide information on carpooling, vanpooling, workplace commuter benefits, public transportation, guaranteed ride home, bicycling, walking, and teleworking.
 - ATDM and ICM initiatives which attempt to manage demand in specific critical areas and corridors through use of information and other techniques that encourage those in these areas and corridors to use alternative routes or services based on existing conditions. Examples in the NYMTC planning area include I-287 in Rockland and Westchester counties and the I-495 ICM project in Manhattan and Queens.
- » **Shared Mobility Programs**—Bikeshare, car share, and other micromobility as well as ride hailing through transportation network companies offer demand-responsive microtransit with related initiatives in the NYMTC planning area. Demand-responsive transportation services (microtransit) provide first/last mile connections to other services or commuting directly from an agency or in partnership with a ride hailing/transportation network company; and bikeshare programs, with CitiBike in New York City since May 2013 and similar programs in suburban counties.
- » New York City's Active Design Guidelines provide a set of evidence-based design guidelines for how the design of buildings, streets, and neighborhoods can be leveraged to prevent noncommunicable diseases and promote overall health, particularly physical activity.
- » **Transportation Systems Management (TSM) Programs**—Programs seeking to improve the operational efficiency of transportation facilities and services. TSM programs in the NYMTC planning area include Traffic Management Centers, TRANSCOM's regional operational coordination, roadway signalization programs across the NYMTC planning area, the development and enhancement of pedestrian, bicycle and micromobility facilities, and incident response through the Highway Emergency Local Patrol system.
- » **Congestion Management/Air Quality (CMAQ) Improvement Program**—Federal CMAQ program funding provides flexible Federal for transportation projects and programs which reduce congestion and pollution for areas that do not meet the NAAQS known as air quality control areas or nonattainment areas, as well as for former nonattainment areas that are now in compliance (maintenance areas). NYMTC's current CMAQ Performance Plan, adopted in 2024, identifies 29

CMAQ-funded projects obligated—i.e., receiving Federal commitment—in whole or in part since the 2022 Plan, totaling \$229 million in obligated funds. Additionally, the performance plan lists 52 unobligated CMAQ-funded projects programmed in the FFYs 2023-2027 TIP, totaling \$533 million. The following excerpt from the performance plan provides an assessment of the impacts of these obligated and programmed funds:

- Obligated CMAQ projects include fourteen projects which enhance or expand transit service levels and/or access to transit services; and programs that manage demand and encourage mode shifts and/or non-SOV modes of travel. In total, just over \$160 million have been obligated for these projects. Also included are obligations of \$3.6 million for four projects which will enhance pedestrian facilities and pedestrian safety. These projects generally contribute to auto diversions and increases in transit ridership and non-motorized modes.
- Unobligated CMAQ projects programmed in the FFYs 2023-2027 TIP include seventeen projects to encourage transit use and/or improve access to transit services; and/or fund demand management programs. Additionally, five projects provide facilities for non-motorized transportation modes. These projects together facilitate increases in market share for non-SOV modes of travel. In total, just over \$218 million have been programmed for these projects.
- CMAQ-funded demand management programs encourage shared mobility and transit use, as well as strategies such as telework that have been amplified by the COVID-19 pandemic. Examples of CMAQ-funded projects that improve transit and facilitate demand management include Employee Commute Options Programs in Westchester and Rockland counties and microtransit zones in the Lower Hudson Valley.

» **Carbon Reduction Program (CRP)**—The Carbon Reduction Program provides Federal funds for projects designed to reduce transportation pollution from mobile sources, defined as carbon dioxide pollution from on-road highway sources. The program requires each State to develop a carbon reduction strategy with projects and strategies for safe, reliable, and cost-effective options.²⁶ As of this writing, NYMTC has programmed approximately \$84 million in CRP funds for eligible projects throughout the NYMTC planning area.

» **NYMTC Members' and Related Agencies' Clean Energy Initiatives**—NYMTC's member agencies, as well as related agencies, individually undertake many energy-related initiatives, including the following:

- **Transit fleets**—Initiatives include purchasing battery electric transit equipment, including buses, vans and non-revenue trucks and automobiles; purchasing and testing of bus fuel cell equipment; upgrading to diesel locomotives; expanding vehicle charging infrastructure and enroute vehicle charging infrastructure; evaluating microgrid use; specialized workforce training; or purchasing either hybrid or all-electric vehicles and ferries that run with cleaner engines in transit life-cycle replacement programs.

» **Other transportation fleets**—Electrification of school buses, taxis, and for-hire vehicles; installing electric vehicle fast-charging hubs; offering incentives for alternative fuel vehicles and electric vehicle ownership.

- » **Public-facing charging/fueling infrastructure**—Expanded fast charging network; curbside charge points and charging locations in municipal public parking lots and garages; private parking garage/lot electric vehicle charging; electric vehicle fast-charging hubs and incentivizing electric vehicle charging stations at centers of employment; and expedited permitting for private installation of alternative fuel and electric vehicle charging infrastructure.
- » **Other agency-owned facilities**—Incentivized solar, energy efficiency, decarbonization and waste management best practices by tenants; replacement of fossil fuels and pairing with renewables where possible; expanded photovoltaics and distributed energy resources, as well as reduced and reclaimed building energy use and energy conservation measures; best-in-class building operation practices and innovative technology; as well as installing co-generation systems and various permanent generators with backup power sources at specified critical facilities.
- » **Freight movement**—Incentivizing zero-emission port drayage trucks and increased intermodal rail and marine freight transportation; expanding sustainable transportation access to facilities; upgrading locomotives and shared charging depots; New York City Clean Trucks Program and NYMTC Clean Freight Corridors recommendations; more access and availability of electric vehicle charging stations and other alternative fuels to support clean freight goals; and using cargo bikes for deliveries.
- » **Aviation**—Support for emerging zero-emission aircraft technologies and reduction of pollution from aircraft movements. Support for the transition to sustainable aviation fuel.
- » **Maritime**—Support for research and implementation of alternative fuels and other clean technology across the maritime industry to reduce carbon and particulate pollutants from vessels; strengthening ferry landings as neighborhood hubs to link other forms of transportation and for emergency response use; using bicycle racks and expanded mobility options, such as bikeshare and scooters, adjacent to ferry landings to connect the ferry system more effectively with nearby neighborhoods; improving connectivity of ferry landings as hubs for buses and other forms of mass transit; and exploring intermodal freight opportunities at ferry landings to improve freight deliveries and further enhance the marine highway.
- » **Transportation management**—Developing a car-sharing network and community-wide bicycle network, including a bike rental network; providing incentives for carpooling/vanpooling; offering next-gen bicycle lanes and facilities with secure bicycle parking, dockless e-scooter and e-bike share systems; rolling out bicycle, pedestrian, and Vision Zero infrastructure; developing trails, greenways, open space and natural areas; further Active TDM and Integrated Corridor Management; full BRT networks; and offering employer commuting programs to encourage alternatives to SOV travel.
- » **Vehicles and traffic regulation**—Reducing unlawful truck idling; charging congestion pricing across low-emission zones; offering alternative fuel vehicles/electric vehicle ownership incentives; and using information sharing across local municipal vehicle fleets through existing Clean Cities programs where feasible.
- » **Transportation System Enhancements**—Chapter 5 of *Moving Forward 2055* describes the system enhancements during the period of *Moving Forward 2055*.

4.8.4 RECOMMENDED STRATEGIES AND ACTIONS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan and contains the following requirement:

The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multimodal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

Several categories of short- and medium-range strategies and actions recommended in pursuit of this vision goal are described below. Additionally, specific projects, programs and studies recommended for funding in the fiscally constrained element of *Moving Forward 2055*, as well as those recommended for future consideration in the speculative vision element of the Plan, appear in Appendix A.

PLANNING AND RESEARCH INITIATIVES

- » Identify core markets, emerging markets, activity centers, and underserved communities using the CDEAs, SED forecasts, and Title VI assessment to develop multimodal plans for the identified areas.
- » Identify the most efficient ways to serve emerging markets and underserved communities, particularly those in areas of low-density development where fixed-route bus service may not be effective.
- » Assess transit service coordination needs across jurisdictional lines and evaluate intermodal connections.
- » Explore technologies related to environmental stewardship.
- » Develop pilot e-bike incentive programs to lower the cost barrier to e-bike use and ownership.
- » Investigate opportunities for better integrating shared mobility and micromobility in the transportation system.
- » Explore incentives for alternative fuel vehicles/electric vehicle ownership.
- » Continue to address congested links and bottlenecks identified by the CMP through multimodal planning studies.
- » Identify opportunities for new technology to improve congestion management solutions.
- » Assess the distribution of bicycle lanes, bicycle facilities, and bike sharing opportunities throughout the NYMTC planning area in terms of fairness.
- » Explore feasibility and infrastructure needs related to implementing new technologies in communities most impacted by transportation pollution.

DATA COLLECTION, FORECASTING, AND PERFORMANCE ASSESSMENT

- » Report on pollution forecasts with each Transportation Conformity Determination.

- » Establish a regionwide active transportation infrastructure inventory.
- » Develop forecasts for active transportation infrastructure preservation.
- » Identify areas to target electrical grid infrastructure upgrades to accommodate future heavy-duty vehicle chargers.
- » Collect data on the number of cleaner fuel vehicles within fleet.
- » Encourage sharing of data to better manage truck movements throughout the region.
- » Collect data to track communities with highest concentrations of transportation pollution and related impacts, including health-related outcomes.

PLANNING PROCESS RECOMMENDATIONS

- » Use Coordinated Development Emphasis Areas and Housing Growth Areas identified in Appendix A of *Moving Forward 2055* as a targeting mechanism for a continuing program of community planning activities.
- » Include alternatives to SOV trips in the program of community planning activities.
- » Convene interagency workgroups through the Transportation Coordinating Committees to identify and address priority multimodal corridors, including exploring technological options.
- » Develop and adopt environmental stewardship guidelines for project selection.
- » Encourage suburban municipalities to adopt Complete Streets policies to accommodate transit, walking, and biking to reduce vehicle congestion and associated pollution.
- » Continue convening relevant agencies and private sector interests through the Multi-State Freight Working Group to improve the efficiency of freight delivery.
- » Develop multi-agency approaches for benchmarking and sharing low and zero-emission vehicle specification information for public fleet procurement.
- » Continue and expand a program of information sharing for local municipal vehicle fleets, through existing Clean Cities programs where feasible.

PROGRAM RECOMMENDATIONS

- » Develop an Active Transportation Education Program.
- » Explore reduction of commute times and improve transit speeds in low- and moderate-income communities underserved by transit.
- » Encourage development in centers and downtowns to reinforce walkable, aesthetically pleasing, and transit-accessible environments.
- » Develop innovative methods of mitigating the negative environmental externalities of maintaining and/or enhancing the existing transportation infrastructure.
- » Test permeable pavement and concrete; install green infrastructure on streets.

- » Encourage the continued development of pedestrian and cycling facilities throughout the NYMTC region, including the expansion of charging infrastructure for e-bikes and e-scooters.
- » Promote the development of microhubs and freight consolidation centers. Expand cargo-hub programs, and other programs that move truck freight onto other modes of transport, including smaller electrified vehicles and water-based options like barges.
- » Develop fare payment integration mechanisms between shared mobility systems and public transit services.
- » Increase access and availability of electric vehicle charging stations and other alternative fuels to support clean freight goals.
- » Procure either hybrid or all-electric vehicles and ferries that run with cleaner engines in transit life-cycle replacement programs.
- » Undertake initiatives that encourage use of public transit; encourage seniors to sign up for reduced fare transit services.
- » Continue and enhance model programs for use at developments such as office parks, medical facilities, and college campuses that include emerging and innovative transportation services such as shared mobility and micromobility.
- » Enhance the public visibility of the 511NY service and its various components and its use for MaaS.

4.8.5 PERFORMANCE MEASURES

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PERFORMANCE METRICS

[23 CFR 450.324](#) governs the development and content of the metropolitan transportation plan. These regulations contain the following requirement:

The transportation plan shall include a description of the performance measures and performance targets used in assessing the performance of the transportation system.

The performance measures listed below will assist in measuring progress toward this vision goal and its objectives, and in informing investment decisions:

- » Criteria Mobile Source Pollution Levels—NYS DEC measures levels of outdoor air pollution at stations throughout NYMTC's planning area.
- » Criteria Mobile Source Pollutant Forecasts included in each NYMTC Transportation Conformity Determination using NYMTC's Post Processor Software for air quality.
- » Pollutant Inventory Levels—The NYS Energy Research and Development Authority compiles an inventory of statewide pollutants including hydrofluorocarbons (HFC), carbon dioxide (CO₂), methane (CH₄), and sulfur hexafluoride (SF₆).

- » Community-Level Transportation Pollutions—Track communities with highest concentrations of transportation pollutants and related impacts.
- » Number of Stations with EV Charging Capabilities—The **United States Department of Energy**²⁷ has compiled an inventory of stations with EV charging capabilities throughout the United States, including within the NYMTC region.
- » Cleaner Fuel Vehicles—Number within the public vehicle fleet.
- » Performance Metrics required for the CMAQ Performance Plan.

ENDNOTES

- ¹ <https://www.energy.gov/electricity-insights/what-electrification>.
- ² [MTA Zero-Emission Bus Fleet Transition](#).
- ³ [Installing a Charging Station—NYSERDA](#).
- ⁴ [Alternative Fuels Data Center: New York Laws and Incentives](#).
- ⁵ [5 Year Transportation Capital Program](#).
- ⁶ [NYC Ten Year Capital Strategy](#).
- ⁷ [BridgeNY](#).
- ⁸ [Charge Ready NY 2.0—NYSERDA](#).
- ⁹ <https://dec.ny.gov/environmental-protection/climate-change/new-york-response/crra>.
- ¹⁰ Texas A&M Transportation Institute, 2023 Urban Mobility Scorecard.
- ¹¹ Need source.
- ¹² [Integrated Corridor Management and Traffic Incident Management: A Primer—FHWA Office of Operations](#).
- ¹³ Active Transportation Resource Center website.
- ¹⁴ National Center for Applied Transit Technology website.
- ¹⁵ MTA website.
- ¹⁶ [MTA First and Last Mile Toolkit](#).
- ¹⁷ Smith, Göran. “Making Mobility-as-a-Service: Towards Governance Principles and Pathways.”
- ¹⁸ [Criteria Air Pollutants | U.S. EPA](#).
- ¹⁹ [Ozone Designation and Classification Information | U.S. EPA](#).
- ²⁰ [Infrastructure State Implementation Plan \(SIP\) Requirements and Guidance | U.S. EPA](#).
- ²¹ [State Implementation Plans and State Plans—NYSDEC](#).
- ²² 40 CFR 93.118.
- ²³ New York State Greenhouse Gas Inventory: 1990–2022.
- ²⁴ 2024 Statewide GHG Emissions Report, New York State Department of Environmental Conservation.
- ²⁵ 23 CFR 450.104.
- ²⁶ [Infrastructure Investment and Jobs Act—Carbon Reduction Program \(CRP\) Fact Sheet | Federal Highway Administration](#).
- ²⁷ [United States Department of Energy](#).